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Insights in sustainable consumption 2022

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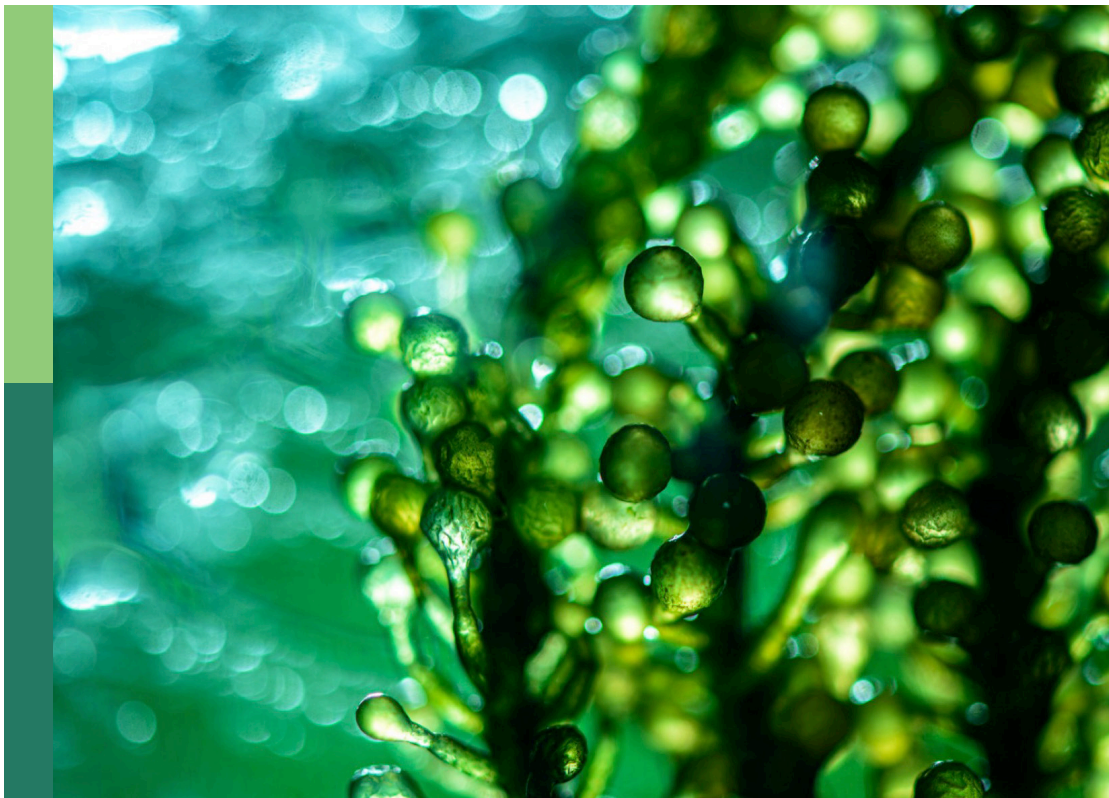

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Insights in sustainable consumption: 2022

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Editorial: Insights in sustainable consumption: 2022

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sustainable consumption, demand side policies, science policy interface, citizen engagement, everyday practice, time use activity data

Editorial on the Research Topic
Insights in sustainable consumption: 2022

Introduction

Sustainable Consumption (SC) research has developed into a well established interdisciplinary field of inquiry that regularly delivers cutting-edge scientific and policy-relevant knowledge on key issues such as energy use, mobility and food consumption. The significance of SC research is also reflected in the growing number of journals and Research Topics that are dedicated to (un)sustainable consumption topics, including the Sustainable Consumption Section in Frontiers in Sustainability. Moreover, recent developments across different areas of environmental and climate policy have shown the urgent need to better understand demand-side issues, further increasing the relevance of SC research. The latest IPCC report (AR6) aptly demonstrates this, especially the report of Working Group III which draws explicit attention to demand-side issues and measures (IPCC, 2022).

The idea behind the Research Topic entitled "*Insights in sustainable consumption: 2022*" was to invite contributions from international scholars in the field that capture fresh empirical insights and novel conceptual and methodological developments and that reflect on current challenges, and future perspectives in sustainable consumption. The Research Topic also reached out to early career researchers, to get their perspectives on the future of SC research.

Contributions to this Research Topic demonstrate the growing diversification of SC research regarding topics, concepts and methodologies. Topics include urban planning practices, ICT ownership and use, food consumption, embodied shopping experiences and post-COVID-19 consumption patterns. It is also possible to detect some overarching themes across different papers, including the impact of digitalisation on consumption. Conceptually, contributions to this Research Topic reflect an ongoing engagement within the research community with core questions concerning the interplay between societal structures and human agency, with a strong focus on more or less routinised everyday practices and their resource requirements and consumption-related consequences. In addition, questions of SC governance and related aspects of (political) power and influence remain of central importance (e.g., Mont et al.; Hirth et al.). Regarding methodological choices, this Research Topic aptly demonstrates the diversity of tools available, ranging from systematic and criteria-led analyses of documents, policy papers and reports to scientifically rigorous empirical research in the field that captures consumption-related attitudes, norms and practices in different countries.

Questions of scale also continue to occupy a prominent position within the field. Articles in this Research Topic evidently cover different temporal, spatial and cultural scales. Examples of local planning strategies to foster sustainable mobility (e.g., Samson and Freudendal-Pedersen) complement "big picture" discussions of global trends toward digitalisation and consumption (e.g., Hynes). Also perspectives from the Global South contrast with contributions from high-consumption countries located in the Global North. Even within the latter group of countries, differences between countries regarding how SC is viewed, practiced and governed are clearly discernible. At the same time, systematic comparisons of different cultures of consumption remain scarce, pointing to future research opportunities that pursue this line of inquiry.

The topic of time and time use also plays a significant role across different articles, although this is not always made explicit. For example, a number of contributions clearly show the diverse impacts of shifts in time use on consumption, most notably the growing acceleration of social and economic activities. As Samson and Freudendal-Pedersen in their contribution to this Research Topic observe, "[...] time is perceived as a limited resource in everyday life which drives (un)sustainable practices." Changing how people view and use time, including those professionals who make urban planning decisions that shape how much time it takes to move between sites of production and consumption, or work, education and leisure, can thus be of fundamental importance for the future of SC. This last point seems particularly pertinent given that many calls for sustainable consumption either implicitly or explicitly assume a radical transformation of how citizens use their time (cf. Rau, 2015). In fact, an emphasis on transforming time use clearly feeds into many SC initiatives, including those that seek to reconnect consumers of food to the world of agricultural production and that encourage people to re-engage with the "temporal logic" of growing and cooking their own food (Hennchen and Schäfer).

What potential future developments in the field can be gleaned from the current collection of articles in this Research Topic? Finding ways to better understand and possibly reconfigure the role of consumption as a central aspect of many everyday practices continues to be of utmost importance. In particular, grasping the diversity of consumption-related social, cultural and material aspects and their complex interactions remains a huge task. For example, the question of how to change values and norms in society to promote a reduction in resource consumption continues to loom large. Similarly, there is ample evidence throughout the paper that citizens' capacity to question, challenge and transform unsustainable consumption needs to be strengthened on a global scale. At the same time, recent efforts in different parts of the world to change how people consume, and what, have shown their conflict potential, especially when SC is perceived to be the pre-occupation of a wealthy "green" elite. Issues of justice, fairness, wellbeing, and adequate accessibility to goods and services thus deserve sustained attention from SC scholars well into the future. These points also closely relate to recent Frontiers in Sustainability Research Topics which address questions of care and sustainable consumption (RT "Sustainable Consumption and Care") as well as issues of sufficiency (RT "From an Ethic of Sufficiency to its Policy and Practice in Late Capitalism").

A major challenge that will continue to be relevant into the future is to build up and maintain channels for an effective science-society-policy dialogue. Many of the findings presented in this RT are highly important to SC advocates and policy makers, especially those insights that relate to societal structures that fuel unsustainable consumption and possible governance processes for the promotion of SC. However, the extent to which scientifically rigorous work reaches the realms of SC activism and policy remains unclear. More work will thus be needed in the future to make SC research matter. Targeted science communication, new publication formats that are easily accessible to decision makers and a choice of language that can be understood by scientific and non-scientific audiences alike could all contribute to a more inclusive and effective science-society-policy dialogue.

Summary of contributions

The research team headed by Doris Fuchs (Hirth et al.) in collaboration with the EU1.5○Lifestyles Consortium emphasizes the need for a more systematic approach to the concept of "structures" and their impact on (un)sustainable consumption. Their contribution invites readers to think more deeply about different types of structures, how they may or may not restrict the agency of individuals in particular ways, and how these restrictions may in fact support the development and adoption of more sustainable consumption patterns at the societal level. By revisiting the long-established structure-agency dilemma, Hirth et al. promote a new and innovative way of thinking about (un)sustainable consumption. Importantly, they use a systematic review of existing research to ground their significant conceptual arguments in empirical observations. As a result, a rich and nuanced picture of shallow and deep structural influences emerges, offering fresh insights into barriers and enablers of 1.5° lifestyles.

Samson and Freudendal-Pedersen call for radical changes in everyday practices of food, mobility, and housing. Drawing on qualitative interview data from Denmark, they point to the impact of (perceived) time consumption on whether more or less sustainable consumption decisions are taken to structure everyday life. The authors highlight the important role urban planning plays in this context and the dominance of approaches to infrastructure planning that favor car-based mobility. To illustrate an alternative perspective on urban space organization, they use the 15-min city concept which postulates that basic urban amenities should be reachable by walking or cycling within 15 min. Samson and Freudendal-Pedersen argue that by providing sufficient resources within walking or biking distance, sustainable consumption opportunities can become more time efficient and thus support the sustainable transition.

Moser and Bader analyse grassroots sustainability initiatives that aim to solve sustainability problems through different forms of experimentation with new patterns of consumption and production. Their work thus complements dominant research on individual pro-environmental behavior. Combining social innovation theory and environmental psychology, Moser and Bader develop and subsequently test various assumptions using a cross-sectional online survey. Their analysis reveals that (1) participation in sustainability

initiatives may have beneficial effects on resource-efficient everyday consumption behavior but (2) that awareness and consideration of user needs is indispensable for scaling up sustainability initiatives beyond the small circle of highly aware and engaged initiators, with a view to engaging the broader public.

Mont et al. analyse the challenge of researching, recommending and applying policies for sustainable consumption that ensure a dignified life for the entire population of the world within planetary boundaries. Through an integrative literature analysis they identify the frequent appearance of a three-step approach, classifying policies that intend to improve, change or reduce consumption. For each category they provide three examples. Recognizing how far Western societies are from sustainable consumption levels, they advocate for further research on winners and losers of the sustainability transition, with a view to supporting effective policy making through the provision of convincing arguments how different groups can benefit in the short and long term.

Hynes tackles the problem that digital Information Communication Technologies (ICTs) bring which were once lauded for their potential to dematerialize society. Based on literature review he provides a broad range of examples how ICTs, and the digital companies behind it, are now imposing additional burdens on the planet. This is not only due to additional energy and material consumption of personal electronics use but also, e.g., due to close collaboration of digital tech companies with fossil fuel companies to accelerate oil and gas extraction. With his article Hynes alerts us to the immense power and influence digital tech companies have over our lives, how they may propel the environment toward collapse and how they influence public opinion.

Hennchen and Schäfer offer a deeper understanding of changing food systems from a socio-ethical perspective. Based on empirical insights that rest upon primary qualitative and quantitative data analysis and an analysis of the relevant literature, they compare citizen shareholder companies with community supported agriculture initiatives and food co-ops. Participation in these innovations sends important signals to the dominant food regime to reward producers for sustainable practices and the establishment of stronger producer-consumer relationships and to motivate consumers to assume shared responsibility for sustainable food system transitions. Here, food innovations generate social cohesion between different actors along the production-distribution-consumption chain. Overall, Hennchen and Schäfer's findings reveal that all food innovations show a rather low level of inclusiveness, although efforts are made to overcome barriers to access. Instead, these initiatives tend to appeal to certain population groups but not to others. Taken together, however, these food innovations complement each other by providing opportunities for people with different motivations and resources to play an active role in food transitions.

Boström et al. analyse the long-term transformative potential of the COVID 19 experience toward more sustainable lifestyles and reduced consumption. Through a content analysis of semi-structured interviews carried out in Sweden and Ireland – countries with very different COVID 19 restrictions – they found that people did not generally long for material objects: they missed meeting people, cultural/sports events but also traveling abroad. Yet some increased their consumption of goods out of boredom. The authors conclude that some long-term lifestyle changes are likely but that these are neither widespread nor consistent across all domains of everyday life. While some practices that emerged during the pandemic will likely remain (like working from home), others will need much external encouragement to continue, including material, technological and infrastructural support by governments and other collective actors. The most encouraging finding by the authors is that the collective memory of different ways to organize daily life and consumption needs offers opportunities to think differently and try out alternatives, remembering what was possible in times of crisis. The fact that people have shown that they can adapt to difficult circumstances and handle limits and restrictions could open up promising pathways toward future consumption-related sustainability transformations.

Solér in her article shows how an embodied view of fashion shopping can increase our understanding of unsustainable shopping practices more generally and help to promote shopping for sustainable products. Based on literature review from marketing and consumer studies, her social and situated embodiment perspective highlights how socio-material marketplace elements configure shopping outcomes. Her findings show that efforts to promote sustainable garments through information provision, such as eco-labeling, will not lead to any major changes in fashion shopping. Instead, she argues unsustainable fashion shopping practices only can change if supply and communication practices in the fashion marketplace change.

Finally, Bhar develops a conceptual exposition on sustainable consumption and the Global South. Reviewing gaps in the sustainable consumption literature, he outlines a conceptual framework which recognizes that corporate-led globalization has led to individual development aspirations of high wellbeing based on material consumption. This, he argues, may hinder any sense of sustained happiness or wellbeing even when people were provided with an objectively defendable decent standard of living. A new understanding of a good life is thus needed which rests upon concepts such as the needs approach or the decent living concept based on the capabilities approach. Moreover, alternative conceptualisations for a good life have to go hand in hand with alternative economic models. Unless the fundamental tendency to push toward individualization based on private material possessions is tackled at its roots, alternative economic models cannot materialize. Thus, Bhar is convinced, recognizing the dialogical interdependence between the good life as a process and as an outcome is critical to designing pathways toward individual satisfaction or contentment within economic models based on sufficiency.

We hope that the diverse contributions to this Research Topic offer valuable insights to SC scholars and activists around the world and that they will inspire ground breaking future SC research.

Author contributions

HR: Writing—original draft. SL: Writing—original draft.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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References

IPCC (2022). *Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge: Cambridge University Press.

Rau, H. (2015). "Time use and resource consumption," in *International Encyclopedia of the Social and Behavioural Sciences*, *2nd Edn*, eds M. Fischer-Kowalski, H. Rau, and K. Zimmerer (Oxford: Elsevier), 373–378.

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Could practices of reduced consumption during the COVID-19 pandemic facilitate transformative change for sustainability? Experiences from Sweden and Ireland

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The COVID-19 pandemic implied a disruption of several consumer practices, which offers an opportunity to explore experiences and possibilities to switch toward more sustainable lifestyles with reduced consumption. This article asks if there is long-term transformative potential toward more sustainable and climate friendly consumption practices embedded in these new experiences. By the use of qualitative interviews, the article explores learning experiences gained by "mainstream" consumers in Sweden and Ireland. A theoretical framework consisting of five themes, also related to previous COVID-19 research, guide the analysis of empirical findings: 1) desired objects; 2) confirmation of social relations by non- or alternative consumption; 3) temporal and spatial aspects; 4) de-normalization of mass consumption; 5) new competences and social support. Findings suggest that the long-term lifestyle transformation possibilities are not vast, but neither are they insignificant. Various positive experiences, with implications for reduced/alternative consumption, can be stored in collective memories even if several consumer practices bounce back to "normal" after the pandemic. Based on the findings, the long-term transformative potential is discussed through the lenses of transformative learning, reflectivity, and adaptative abilities. The study contributes to the literature on sustainable and reduced consumption, including literature on degrowth, sufficiency, and downsizing.

KEYWORDS

adaptation, climate friendly, consumer practices, disruption, lifestyle, reflectivity, transformative learning

Introduction

Humanity exceeds several of the planetary boundaries (Steffen et al., 2015). An important root cause of this problem is the excessive amounts of consumption, particularly in wealthier parts of the globe. In wealthier societies, people in all social classes grow up in a structural and cultural context of mass consumption

(Schor, 2005; Jackson, 2017). Although some citizens voluntarily try to develop new lifestyles with less consumption as goal as a way to cope with the environmental pressures, the prevailing social norm and practice is to consume "more, better, and bigger" (Sahakian, 2017).

However, the COVID-19 pandemic interrupted parts of this trend. In several ways, the pandemic implied a disruption of mainstream consumer culture. People's lifestyles have been significantly affected. Whereas some kinds of consumption and consumer activities have been, in periods, impossible or greatly restricted (e.g., air travel, shopping, clothes, restaurants, hotels, visiting amusement parks and public events), others continued as before or increased (food, online shopping, traveling to nearby nature parks, furniture, household articles including services for the household, communication devices) (see Echegaray et al., 2021; Holmberg, 2022). Viewing the pandemic crisis as a "window of opportunity" for transformative change (de Haas et al., 2020; Almeida et al., 2021; Dartnell and Kish, 2021; Orîndaru et al., 2021; Forno et al., 2022; O'Garra and Fouquet, 2022; Schmidt et al., 2022) this disruption to consumer practices offers an interesting opportunity to explore experiences and the potential for "switching actions toward a more responsible, lower footprint way of living", (Echegaray, 2021 p. 568; see also Greene et al., 2022). A key question is if new consumption patterns brought on by the pandemic have the potential to institutionalize, i.e., if they can result in durable change. Even though some consumer practices are returning to a "normal" pattern as seen before the pandemic (Holmberg, 2022), the question is still relevant because the disruption can be seen as a learning period of importance for coming crises and transformation of society.

In this article, we ask if there is long-term transformative potential toward more sustainable and climate friendly consumption practices embedded in these new experiences. The article explores insights and learning experiences gained by consumers, in Sweden and Ireland, from the involuntary disruption of many consumer practices caused by the COVID-19 pandemic. The purpose is to contribute knowledge about new experiences and insights that people gained from this disruption, with a particular focus on the long-term transformative possibilities to reduce excessive and high climate impact consumption. Hence, it contributes to the literature on sustainable and reduced consumption, not the least literature focusing on related topics and concepts such as degrowth, sufficiency, downsizing, and voluntary simplicity. The study is based on qualitative methodology and includes interviews with people from Sweden and Ireland.

The next section introduces the theoretical, thematic framework, in which recent research findings about the pandemic experience is also integrated. Then we present the method and methodological reflections. The result section is divided into five parts using the same thematic structure as the theory section. In the final concluding section, we discuss long-term transformative potential through the lenses of transformative learning, ambiguity and reflexivity, as well as adaptative abilities.

Theoretical points of departure and thematic framework

The theoretical framework considers how social practices and relationships in one's social life shape consumer motivations and practices, including attention to both macro/structure and micro/agency. On the one hand, existing lifestyles are deeply shaped by macro-institutional structures and social-material infrastructures in society, including an expansionist economic system (capitalism), industrial/technological development, a global economic geography facilitating production, distribution, and provision of goods for the mass markets, and a political ideology of growth (see Boström, 2020). Taken together, the institutions and infrastructures of mass-consumption have contributed to a far-reaching commoditization in contemporary societies, which in turn make it necessary for people to make marketplace choices in a growing number of areas of everyday life. Moreover, our contemporary societies have become dependent on economic growth and insatiable consumer demand for their social stability (securing welfare and jobs; see Jackson, 2017). Consumer culture accordingly push people toward mass consumption habits (Schor, 2005; Sassatelli, 2007).

On the other hand, people are not just pushed from above, but are themselves active in reproducing mass consumption habits. Our theoretical perspective assumes that agency and meaning are shaped by social relations, both intimate and indirect/distant relations, in their everyday life. This perspective further recognizes how people are born into and naturalize their social lives in their material contexts by developing worldviews, norms, roles, habits, and identities. This naturalization involves taking existing consumer culture for granted (e.g., Schor, 1998; Wilk, 2002; Dittmar, 2008; Miller, 2010). Attention to social agency must be included to understand the reproduction of social structure and culture, as well as to understand conditions for change. We moreover take advantage of the social practice theory, which argues that the thinking, feeling, acting of individuals are embedded in the socio-material environment (Shove, 2010; Spaargaren, 2011; Forno et al., 2022; Hoolohan et al., 2022). The notion of practices offers a lens to consider lifestyle change that involves more than just cognitive aspects such as preferences, values and insights. Social practices include routinized, normalized, and socially embedded habits. We can look at many lifestyle changes that happened during the pandemic as changes of practices, such as working from home, cooking, and online shopping (Ehgartner and Boons, 2020).

As we are interested in reflecting on the potential for long-term change, we need to address an overall temporal dimension (in broader sense than the third theme below). It

is important to reflect on the difference between immediate changes that happened during pandemic and more long-term changes/effects. Even if such distinctions are hard to make, it can nonetheless be reflectively done and informed by some empirical evidence and theoretical arguments. For example, Kirk and Rifkin (2020) distinguish between immediate and more long-term transformative change resulting from the pandemic experience, and refer to three temporal frames: reacting, coping, and adapting. Echegaray et al. (2021) distinguish between accelerated (e.g., digitalization), decelerated (e.g., popularity of dense cities), and unexpected trends (e.g., homebody life) due to the pandemic. They argue there are a variety of practices that may be here to stay, like the sudden acceleration of digital systems and the enjoyment of non-commercialized forms of leisure in outdoor parks (Echegaray et al., 2021; p. 4). Some of these changes will become irreversible, whereas others need encouragement by governments and policy to endure.

For our purpose, the notion of transformative learning is interesting to consider. Transformative learning is a perspective stressing a critical, self-reflective dimension of learning; learning that questions basic frames of reference and "habits of mind" (Mezirow, 2009; Lotz-Sisitka et al., 2015; Boström et al., 2019). An external crisis such as a pandemic can be an important trigger for reconsidering knowledge and stimulate alternative paradigms (Almeida et al., 2021). With reference to changed lifestyle and practices of reduced consumption, a general process of transformative learning may be needed as people have been so deeply socialized into reproducing mass consumption habits (Boström, 2020). In this context, transformative learning would entail challenging many norms, practices, and taken-for-granted assumptions related to consumption. A study of *voluntary* downsizers showed the importance of transformative learning (Boström, 2022). What we are examining is whether an *involuntary* disruption of consumer practices, such as the one caused by the COVID-19 pandemic, could trigger similar learning processes. Given the forceful economic and political macro-factors addressed above, a process of transformative learning among the public will not alone achieve long-term societal transformation. Nonetheless, we see it as a necessary part of a larger transformative change process.

By taking these general theoretical perspectives as points of departure, our framework moreover consists of five theoretical themes, which guide and structure the subsequent empirical analysis. These themes can be applied to study the possible insights and learning experiences consumers gained from the involuntary disruption of many consumer practices caused by the COVID-19 pandemic.

The first theme is about *desired objects*, which is motivated by a variety of studies of consumer culture showing how vital consumption is for providing *meaning* to the consumer (e.g., Richins, 1994; Schor, 1998, 2005; Wilk, 2002; Belk et al., 2003; Bauman, 2007; Sassatelli, 2007; Dittmar, 2008; Jackson, 2017). Commodities may be valuable to the individual because of their usefulness, the pleasure they bring, the sense of freedom they bring, the interpersonal ties they represent, for identity formation, or for the social status they symbolize. Given such desires, the pandemic offered an opportunity to ask about experiences during the pandemic disruption regarding temporarily unfeasible but desirable objects/services. What consumer objects/services have people longed for during the disruption? Have these desires been satisfied in other ways, by non-consumption or alternative consumption? Are consumers expecting to enjoy the objects/services (e.g., air travel) and going back to previous practices after the pandemic?

Some previous COVID-19 studies observed that people during the lockdowns, faced with a situation of scarcity of socializing, longed for socializing with relatives and friends rather than for material objects (de Haas et al., 2020; Echegaray, 2021; Moynat et al., 2022). Faced with mobility restrictions they longed for freedom in a spatial sense, and they missed activities that were restricted and the possibility to travel various places (Echegaray, 2021; Strömblad et al., 2021; Moynat et al., 2022). However, physical stuff can also be sought for: the pandemic could stimulate a resurgence of hedonistic attitudes connected with phrases such as "I could die tomorrow" or "You only live once" (Zwanka and Buff, 2020).

The second theme is about *confirming social relations by non- or alternative consumption*. This theme derives from various theories on how consumer culture intersects with everyday rituals and relationship practices. In modern society consumption has become key in various activities that serve to establish and maintain social relations. There is a number of everyday "rituals" or activities that families and friends are doing together to confirm their relations (Rook, 1985; Collins, 2005). These everyday rituals are in many ways tied to consumer objects (fashion, gifts), activities (shopping, dinners, holidays, birthday parties) and settings (the shopping mall, the café) (Miller, 1998; Sassatelli, 2007; Boström, 2021a). For instance, the traveling abroad for the weekend holiday bolsters the family unit or the romantic relationship. These everyday rituals also give rise to (consumption) norms within the social group, which can be difficult to break with.

The pandemic offered interesting opportunities to study to what extent consumers replaced, for example, long-distance tourism and shopping, with other ways of cultivating their social relations. COVID-19 research has shown that people learned to use online platforms for virtual dinner parties, religious services, weddings, and music performances (Kirk and Rifkin, 2020; Sheth, 2020; Echegaray, 2021). The pandemic also gave people a chance to reconnect with one's closest relations and rediscover the importance of family relations with activities such as baking, cooking, gardening, jigsaw puzzling, family games, joint nature walks, outdoor activities, and local tourism (Benjamin et al., 2020; Borsellino et al., 2020; Kirk and Rifkin, 2020; Sofo and Sofo, 2020; Bohman et al., 2021; Echegaray, 2021; Lõhmus et al., 2021; Matacena et al., 2021; Collins and

Welsh, 2022; Hoolohan et al., 2022; Moynat et al., 2022). Such studies indicate the relevance of reflecting on how issues of social relationships intersect with patterns of consumption and resource demanding lifestyles. Cohen (2020) also points to how difficulties of socializing during the pandemic may have resulted in a decline of other drivers connected to excess consumption, such as status consumption (conspicuous consumption). For example, studies have found that the role of fashion, appearance management, fear of social pressure dampened (Esposti et al., 2021; Kempen and Tobias-Mamina, 2022).

The third theme is about temporal and spatial aspects, more precisely aspects related to mobility, remote working, homebody life and different paces of life during the pandemic. Temporal and spatial aspects are key to consider in analysis of mass/excess consumption (Bauman, 2007; Boström, 2020; Rinkinen et al., 2021). For example, high levels of spending relate to the common experiences of work-life unbalance and hurriedness in social life (Schor, 1998; Knight et al., 2013; Greene et al., 2022). In contrast, freeing up time can help nurture alternative practices (see Gojard and Veron, 2018; Boström, 2022). For some segments of the population, the mobility restrictions and teleworking opportunities brought on by the pandemic created a potential for a slower pace of life and improved work-life balance, which in turn could favor the development of slower alternatives to (fast) consumerism, including practices such as repairing, gardening, developing DIY skills, searching for local food and engaging in "slower" cooking and baking (Ehgartner and Boons, 2020; Jribi et al., 2020; Aktar et al., 2021; Babbitt et al., 2021; Cosgrove et al., 2021; Filimonau et al., 2021; Matacena et al., 2021; Strömblad et al., 2021; Forno et al., 2022; Greene et al., 2022; Moynat et al., 2022). However, the blurring of work and other activities in the home could also increase stress (Sheth, 2020; Echegaray et al., 2021), and more time spent in home can be problematic for other reasons, for example in over-crowded domestic environments (De Groot and Lemanski, 2020). People with strong social relations, generous indoor spaces, and access to outdoor natural environments experienced higher levels of wellbeing (Moynat et al., 2022).

A related important topic is the lower demand for transport, which some expected would continue after the pandemic (Kanda and Kivimaa, 2020). For instance, by use of survey data, one study in the British context found substantial expressions of willingness to reduce car use and air travel also on the long term after the pandemic, which related to experiences of more available time and slower everyday life (O'Garra and Fouquet, 2022). Nonetheless, a key worry is continued avoidance of public transportation and preference for individual modes of transport like cars (Bergantino et al., 2021; Bohman et al., 2021; Eisenmann et al., 2021; Jiang et al., 2021; Zhang et al., 2021). While spending more time at home reduces demand for transport, a more homebody life will likely increase demand for energy and objects related to the home: online shopping, streaming entertainment, procurement of home appliances, as well as more heating or cooling (Ehgartner and Boons, 2020; Jiang et al., 2021; Monzón-Chavarrías et al., 2021). Yet another mobility aspect relates to new conceptions and visions of tourism and leisure, which may grow as a result of the pandemic. This includes ideas around home-based leisure such as home gardening and more outdoor activities in the local area (Ehgartner and Boons, 2020; Sofo and Sofo, 2020), domestic, slow and small scale tourism (Ateljevic, 2020; Benjamin et al., 2020; Hall et al., 2020), even virtual reality as replacing travel (Zwanka and Buff, 2020).

One more point to consider concerns how digitalization, lockdown and social distancing have facilitated online shopping, which in literature has been related to time saving and less traveling (Borsellino et al., 2020; Shamshiripour et al., 2020). It is however an open question if this opportunity boost or prevent consumerism. On the one hand it may prevent impulsive buying, as many of the triggers in the physical outlet are removed. On the other, there are 24/7 opportunities for shopping, which may even facilitate opportunities for compulsive buying (Huang et al., 2022).

The fourth theme concerns *de-normalization of mass consumption*. The context is that an individual socialized into mass consumption society tend to perceive contemporary modes and levels of consumption *normal* or *natural*; that is, taken for granted (Schor, 1998; Wilk, 2002; Sassatelli, 2007; Sahakian, 2017; Boström, 2020). As normalization of increased demand is a gradual and unconscious historical process, it is generally gone unnoticed. Indeed, in wealthy societies today, it is seen as perfectly "normal" and "natural" to live a life with ecological footprints that several times exceed the planetary boundaries. Normalization means that existent standards and routines are taken for granted, it prevents consumers' ability to imagine alternatives, such as seeking a happy life with less consumption and lower standards of living. Moreover, deviation from standards (of living) and social norms can result in shame and stigma (Cherrier et al., 2012).

Because things that are taken for granted can be revealed by disruptive events (cf. Kotler, 2020; Sheth, 2020; Tchetchik et al., 2021), the pandemic offered an opportunity to explore possible processes of de-normalization. How and to what extent did the disruption reveal the norms and normality of mass- and excess consumption? COVID-19 research shows that the pandemic provoked some reflexivity (Hoolohan et al., 2022; Moynat et al., 2022), that people started to rethink consumption habits (Aktar et al., 2021; Esposti et al., 2021; Matacena et al., 2021) encouraging mindful consumption and increased attention to health, financial saving, and how the pandemic linked with environmental pressures (Borsellino et al., 2020; Zwanka and Buff, 2020; Echegaray et al., 2021; Orîndaru et al., 2021; Severo et al., 2021; Tchetchik et al., 2021; Schmidt et al., 2022). Such reflections may not cause a general de-normalization of consumer culture, but at least indications of some questioning and increased caution. Ability to distinguish between essential and non-essential consumption have been noticed (Echegaray

et al., 2021; Perkins et al., 2021), and Zwanka and Buff (2020) argue that COVID-19 sensitized us to the fact that individual action may impact on the health of others: "How much 'right' do you have to engage in an activity when it can have harmful effects on others not engaged with you" (Zwanka and Buff, 2020, 65).

The fifth and final theme concerns *new competencies and social support*. The reduction of consumption of commodities will require both cultivation of new individual competences such as making rather than buying, repairing, home cooking, growing own vegetables, and making use of social capital in the local community so people can gather around such skills (Schor and Thompson, 2014; Hagbert and Bradley, 2017). Social capital involves paying analytic attention to the wider social network in the community, to gain symbolic (legitimacy), cognitive (knowledge, ideas, skills), and material/infrastructural resources (platforms for sharing, repairing, etc.). The need to cope with difficulties experienced during the pandemic may hypothetically be a factor for the establishment of new competences and they may activate important aspects of civil society action in terms of mutual helping. What new competencies and broader social support in civil society were activated to facilitate coping with the COVID-19 disruption? Can such or similar support continue after the pandemic, and facilitate a transition toward more sustainable consumption?

Some COVID-19 literature stressed the positive role of new DIY competences in relation to cooking, baking, gardening, repairing and digital technology (Borsellino et al., 2020; Bin et al., 2021; Dartnell and Kish, 2021; Perkins et al., 2021; Forno et al., 2022). Another area is increase of physical activity, which in turn could serve to legitimize more outdoor activities and conservation of nature reserves in the local community (Zwanka and Buff, 2020; Collins and Welsh, 2022), and facilities for biking and bike-sharing (de Haas et al., 2020; Bergantino et al., 2021). Kirk and Rifkin (2020) argue that increased DIY-competences will bolster the feeling of competence and wellbeing thanks to ability to achieve things on one own (see also Sheth, 2020). Moreover, increased frugality competence due to rising economic uncertainty and loss, which involve more saving and redirection of consumption to goods and services, is seen as essential (Echegaray, 2021).

There are also potential negative consequences resulting from the pandemic such as a backlash from collaborative consumption and the sharing of goods and services (de Medeiros et al., 2021). According to Echegaray, because of fear of contagion, there is a "regression toward heightened individualism and giving priority to ownership rather than access" (Echegaray, 2021; p. 569). Perkins et al. (2021) however suggest the pandemic experience may lead to a rejection of "rugged individualism". Rugged individualism is a view of the self as self-reliant, independent, and with capacity to regulate behavior as a result of will and volition, and through the efforts, abilities and decisions of the individual. This was evident in the practice of hoarding, as well as in the hunt for resources such as ventilators, vaccine, and personal protective equipment. Nonetheless, this idea of the sovereign individual might have been shown increasingly impossible as a way to solve crises, instead favoring a collective responsibility: "the pandemic points to the fact that we must totally redefine what it means to be an individual in relation to others" (Perkins et al., 2021; p. 6). Another positive scenario is pictured by Collins and Welsh (2022) suggesting, by experiences from the UK context, that the pandemic could catalyze a "green recovery" on the local level, including support for more localized economies (see also Dartnell and Kish, 2021; Nemes et al., 2021; Forno et al., 2022). Experience with networks and neighborhood groups providing essential practical and emotional support for the most vulnerable could strengthen local social capital and a sense of care for the local, thus creating a preparedness for future health/environmental crises.

Method and material

This study is based on a total of 33 interviews, 23 with Swedish consumers and 10 with Irish consumers. During the outbreak of the COVID-19 pandemic, from March – May 2021, semi structured interviews were conducted with people living in Sweden. Sweden stands out in international comparison as one of very few countries to avoid strict "lockdown" measures. Society has remained relatively open, and the strategy has relied more on voluntary compliance with recommendations than legislation and penalties. To complement the Swedish interviews, ten interviews with Irish participants were conducted between August and November 2021. The study was not designed as a cross-cultural comparison, rather to increase the span of experience among interviewees.

In contrast to Sweden, Ireland has seen some of the harshest COVID-19 restrictions in Europe. At the time of the interviews, the participants had been through three full lockdowns. Measures during these lockdowns included the closing down of all non-essential retail and hospitality, a complete ban on both public and private gatherings, as well as strict limits on non-essential travel. In spring 2020, movement within a 2 km radius of one's home for exercise purposes was permitted, this was later extended to 5 km (Government of Ireland, 2022). Failure to comply with these, and other, measures could result in a fine (An Garda Síochána, 2021). Naturally, these measures meant opportunities for consumption and other activities were far more restricted in Ireland. However, despite the absence of full lockdowns and penalties for non-compliance, everyday life was far from unaffected in Sweden. Shops, bars and restaurants may have remained open but restrictions on opening hours and number of visitors allowed did intensify over time, and the maximum number of participants allowed at public gatherings went as low as eight in November 2020 (Government

Offices of Sweden, 2022). In additions to these measures, all citizens were expected to follow general recommendations to avoid social contact (Public Health Agency of Sweden, 2022). As a result, consumption went down drastically in some areas like traveling, purchase of new cars, hotels/restaurants, and clothes (drop only in Sweden). Household expenditure on goods and service dropped 10% in Ireland 2020[1]. In Sweden, total household consumption in 2020 dropped 4.7% compared with 2019, however according to tentative figures a return to almost previous volumes in 2021 (Holmberg, 2022). The recommendation to work from home if possible was also adhered to in both Ireland and Sweden, with possible knock-on effects on consumption. By the end of 2020, 46% of Irish workers worked at least partially from home (Central Statistics Office, 2021). At the start of 2021, similar figures were reported in Sweden: 42% worked at least partially from home (Statistics Sweden, 2021).

Interviewees in both locations were selected purposively, the main criterion being that they were "mainstream consumers" in their own opinion. In total of 23 women and 12 men participated. Two of the Swedish interviews were conducted with couples living together. A few of the Swedish participants were single and some lived in apartments, but most were houseowners with a live-in partner or spouse. The living conditions of the Irish participants were more diverse and also included young adults living with their parents or "housemates". The age of the participants range between mid-twenties and early seventies and the sample includes students, people employed in public and private sector, on sick leave and retirees. The Swedish participants lived mainly in mid-size towns in central Sweden. The Irish participants were mainly concentrated in and around Dublin city. In terms of social class, there is a slight middle-class bias in the Swedish sample whereas around half of the Irish participants have a working-class background.

The interview guide was based on the five themes guiding the study and the same guide was used throughout the study, only with added follow-up questions for a more in-depth interview. Participants were encouraged to elaborate and speak from their own experiences of their consumption patterns during the pandemic, covering the five guiding themes. Interviews lasted about 60 min.

Interviews were mainly conducted online *via* Zoom, however four participants wished for telephone interviews which was granted. Physical meetings were not offered to minimize the risk of Coronavirus transmission during the pandemic.

All interviews were audio recorded, transcribed and analyzed thematically. To ensure participants' identities remain anonymous, personal details have been left out. For ethical considerations and concerning the GDPR, questions about personal and sensitive matters were excluded from the interviews.

1 See Available online at: https://www.cso.ie/en/releasesandpublications/ep/p-elic/economiclifeandcovid-19inireland2020-2021/whatweconsumed/ (accessed May 09, 2022).

Findings

Desire: Longing for socializing, traveling, and cultural activities

When looking for the most desirable objects among participants' statements, the results show, as also noticed by others (de Haas et al., 2020; Echegaray, 2021; Moynat et al., 2022), that it was not material objects they missed the most. Despite the closure of non-essential retail during the lockdowns in Ireland, none of the participants described this as a major problem as most goods were available to purchase online. In Sweden, which did not enter a state of complete lockdown, material needs could be met by also visiting conventional stores.

What the participants longed for were new experiences to break the everyday routine as well as social relationships. Firstly, the wish to travel seems to be the most desirable area of consumption during the pandemic. Many of the Swedish participants expressed a desire to travel abroad but they also expressed a longing to travel within the country for leisurely weekend trips as well as visiting friends and extended family. Regarding air travel, it was not unusual for participants to fly to other countries in Europe or other parts of the world at least once a year, sometimes more.

However, not all participants were frequent travelers before the pandemic and yet others claimed they did not miss foreign travel as they found plenty to do in their country. Instead of traveling abroad, people traveled within Swedish borders, to the mountains or other typical tourist areas. Some were owners of holiday homes or boats and made more use of this. While at home, participants favored, for example, visiting lakes, biking, hiking and golfing. Outdoor activities with family guided their interests.

In Ireland, the perceived need to travel abroad was emphasized more strongly. Close to all Irish participants brought up international travel as the number one thing that they missed. The restrictions on movement within the country, at least during the lockdowns, may have played a role in this as the option to replace international travel with domestic travel was more limited. To some, it was not travel *per se* that was missed but freedom of movement in a larger sense:

> *I was longing for freedom. Because, before the pandemic, I would have went on a few holidays a year to wind down. That was taken away. And for a long time, we couldn't even travel outside 5K without being stopped by the guards. It felt*

> *like there was guarded checkpoints on every corner, and they were questioning where you were going. So I definitely feel like a lot of my freedom was taken away (Interview IE_32).*

The second area of consumption missed was going to restaurants and cafés. In Ireland, several participants also brought up the pub as an area of consumption that they missed. However, as we will see in the next section on social relationships, some of the participants actually saw spending less time in the pub as positive aspect of the pandemic.

Thirdly, cultural events, such as concerts, theatrical- and musical plays, were much longed for by some interviewees. As most Irish participants lived in Dublin city these activities usually did not necessitate travel but for the Swedish participants, they were often linked to weekend trips to a bigger city. However, some also mentioned missing the local cultural events such as art exhibitions and the musical life in churches. In addition, others mention sporting events and the missed opportunities to visit the local arena to watch ice-hockey or football.

Travel, going to restaurants, concerts and sporting events are all desires linked to consumption. However, when one delved deeper into the reason why these activities where missed, it was clear that it was not the consumption itself that was missed but rather the social relational aspects of this form of consumption (see also next theme). When looking for long-term transformation possibilities this opens up at least some opportunities for de-emphasizing consumer objects. Many participants described realizing what *truly matters* during the pandemic. In the Swedish case in particular, several participants also expressed a heightened sense of appreciation for the local area. Their leisure activities during the pandemic also show a wide variety of possibilities to spend future holidays closer to home with the benefit of reducing emissions by less travel and the additional consumption connected with traveling[2]. In Ireland, although many saw spending more time outdoors as a positive aspect of the pandemic, this was mainly seen as a benefit to their own sense of wellbeing, and they did not envision reduced air travel abroad in the post-pandemic future. All but two of the Irish interviewees had already been on at least one international flight at the time of the interview. The timing does play a role here, whereas the Swedish interviews were conducted at the height of the pandemic restrictions, the Irish interviews were conducted at a time when societies had opened up somewhat which facilitated more extensive travel.

2 It is possible that Swedish families, who have lived in Sweden for generations, find it natural to go out in nature due to the Right of Public Access. The Right of Public Access can be seen as part of the Swedish cultural heritage and is a part of the Swedish constitutional rights. Access to a holiday home is also far more common in Sweden than in many other countries, including Ireland.

Confirming social relations by (non)-consumption

As shown in the previous section, social life is closely linked with consumption. Participants valued social relationships higher than before the coronavirus outbreak, and some participants gained new perspectives on the intersection between socializing and consumption.

Common everyday social activities before the pandemic were, for example, meeting for lunches, shopping at lunch time, going to the gym, visiting the shopping center during the weekend, and going on spa weekends. In the Irish interviews, pre-pandemic activities were in some respects clearly gendered. The men interviewed where more inclined to see the pub as central to their social life, whereas several women described regular shopping trips to the UK with friends or family. When the pandemic put all this to a halt, social activities had to take on different forms. As larger gatherings were not allowed, social life circled around seeing perhaps one close friend or only people within the household. For Swedish participants living close to family members and friends, socializing took part mainly outdoors. They met at home in private gardens, went for walks in the local neighborhood or hikes and picnics further afield. Going for walks in the local area was a common pastime in Ireland as well, but during the lockdown visiting other people's gardens was prohibited which limited options even further, as did the 2–5 km restriction on domestic travel.

When unable to meet in person, participants kept in touch over the phone or *via* online video calls. Several Irish participants said online quizzes and games with friends were common at the start of the pandemic, but that this gradually died down as it was not the same as meeting in real life. One 34-year-old man whose Dungeons and Dragons game had moved online said he preferred the in-person game as the flow of conversation was better, but he also saw a benefit to moving online as he had reconnected with friends who had moved abroad and who could now take part in the game. Some other positive side effects were also mentioned, such as sharing meals at home with the spouse, which at other times was not possible due to working hours. Additionally, socializing outdoors felt "healthier" and it was perceived as easier as cooking was not required and the home didn't have to be prepared with extra cleaning. Many expressed a wish to continue with the new habit of spending more time in nature:

> *The sort of consumption that's not beneficial… it is a short-lived enjoyment, but not important anymore. That will be the biggest change – no more Saturdays in town, wasting time… I much rather spend time in nature with my doggy and people I enjoy being with (Interview SE_20).*

Some participants testified to consumption being expected together with friends and a few expressed a new insight: they

were now able to get together and have a good relationship without having to consume as much. Again, participants claimed they now cared more about their social relationships than before the pandemic and some expressed that they had connected on a deeper level with friends and family as the pandemic had forced them to spend time together in a more pared down way. A 28-year-old Irish woman described it the following way:

> *It is a better thing, being out in nature and being away from other distractions. I mean, the pub could be distracting sometimes – you are there for the wrong reasons. Sometimes you go to a restaurant just because it is a new restaurant and a cool restaurant… You are going there because it is cool and hip and whatever. Whereas your real motivation should be that you want to spend time with that person, and it should not really matter where you go (InterviewIE_24).*

A 23-year-old male participant from Ireland also described connecting with his friends in a more meaningful way during the pandemic. Instead of going to the pub they had gone for walks together and he found that away from the "toxic show-offiness" of the pub, he got to see real parts of his friends that he had not seen before.

From a transformative perspective we can see some clear incentives for long term social change on this theme. As social life was taken outdoors it came with several positive side effects such as health benefits, less stress, a more easy-going lifestyle in social life and, in some cases, more meaningful relationships. In both countries, some – albeit far from all – clearly expressed a new insight that they had found a way to socialize without consuming as much. We see this insight as highly important on both an individual level, as well as on a group level. If consumption can no longer be the common ground for interaction and socializing in social life, an appealing alternative must be found.

Temporal and spatial aspects: Slowing down and homebody life

This third theme appeared to be the most significant in our study. The participants' reflections on the changing temporal and spatial aspects of consumption during the pandemic are divided into several aspects.

First, an interesting result is that most participants in both Sweden and Ireland stated they *gained time* during the pandemic. Everyday life on a whole *slowed down*. It is particularly clear among those working remotely, but others too, testify to gaining time even when working away from home (less crowded commuting). Even retirees gained time, for example by not going to the regular exercise class or joining various social activities.

For most people who lived with a family or a partner, gaining time was seen as positive and as stress reducing. While social gatherings were missed, participants described how pleasant it was to slow down, take it easier, and spend time with their family without the expectation to socialize outside of the family. Indulging in more time on their own, the home itself became more important and participants expressed that they valued their everyday life to a greater extent. The pandemic also gave room for other interests: outdoor activities, cooking, bread baking or caring for the home and garden.

The extent to which the slower tempo was perceived to reduced consumption varied a great deal between the participants. Several participants devoted time to clear up among belongings and to some, finally having time to do this led to new insights about their possessions. A 28-year Irish woman described her experiences the following way:

> *Before I buy something, I think "would I rather wear what I have at home?" […] I donated 16 bags, over covid, of shoes, clothes, bags, everything. That was a huge change. I got rid of everything that I did not like or that I did not want. I now have like a template of clothes that I love. That I always gravitate toward (Interview IE_24).*

For a number of the Swedish and Irish interviewees, like the 28-year-old Irish woman quoted above, the slower tempo led to a greater appreciation for what she already had and a decreased need to buy new clothes. However, shopping is not always about the goods themselves, it can also be an *activity* that fills time. For some participants, shopping was substituted by other activities such as walks in nature with the dog. Others found it more difficult to "fill their time" and expressed that their lives had become dreary, uneventful, and repetitive in parts. This dreariness was in large part attributed to a lack of social connections and some people also described feeling lonely. Among those who perceived life as dull during the pandemic, there seemed to be a tendency toward wanting to return to a previous lifestyle with frequent air travel and consumption patterns related to their social life. These people were also more likely to say consumption, especially online, had increased during the pandemic. Hence, consuming was a way of breaking up the monotony of life during the pandemic. As one 34-year-old Irish man described it: looking forward to concerts or holidays was replaced by the anticipation of waiting for a package to be delivered.

A second aspect concerned *a shift in consumption in terms of buying for the home*. When travel, cultural life, and restaurant dinners were impossible to carry out, consumption shifted toward the home and outdoor equipment. One Swedish family hired a garden architect instead of spending money on travel. Another family bought home décor and equipment for hiking and golfing instead of buying new clothes for parties and a trip to Thailand, a 49-year-old Swedish woman said:

> *Focus has shifted from spending time and money outside of home, home is more important now, so that's where we focus. … "Oh, we need a new chair" or "this room needs a makeover". Consumption has shifted in a way, I think (Interview SE_05).*

Several participants described spending more money on home improvement. They had spare time to do this kind of work and, as most of the participants had not been seriously economically affected by the pandemic, they had money to spend on their homes that they would normally have spent on other things. Some also described how spending more time at home made them see "flaws" in the home context that had not been apparent before. Official statistics confirms this picture of relocation of spending, however with some difference in the Swedish and Irish contexts[3]. Remote working and schooling[4] created additional needs for the home: desks, chairs, computer screens, increased internet capacity. A need for a new kind of home infrastructure occurred as consequence of the pandemic. Even demand for home extensions may result on long term (see Hand et al., 2007), although this was not generally emphasized by interviewees.

Many of the participants appreciated the convenience and flexibility of remote working. They describe saving both time and money working from home. Parents, in particular, expressed that it improved their work-life balance. Work is expected to be more flexible post-pandemic as well and several participants already had arrangements in place to continue working from home at least part of the week. There were a few exceptions, however. One 34-year-old Irish man missed the separation between work and home. Despite saving at least an hour a day not commuting to work, he found that not having a clear end point to the working day made him much less efficient: "it was always a little bit of procrastinating and a little bit of working way too many hours".

Reflections about the climate and environment appeared quite frequently among participants in relation to remote work, everyday commuting and business trips to attend meetings. Both commuting and business trips were perceived to be unnecessary climate change drivers which several participants were happy to abstain from. The participants' willingness to keep working from home part of the time, is a promising sign of societal change toward sustainable lifestyles as it implies less demand on mobility.

A third aspect concerned a *shift in consumption in terms of buying from the home*. The pandemic not only affected *what* the participants did and did not buy, it also affected *how* and *where* they bought them. Unsurprisingly, following accelerated digitalization (Echegaray et al., 2021), online shopping increased during the pandemic. Most participants were already accustomed to online shopping before the pandemic. Although some said they preferred in-store shopping, the transition to shopping more online seemed to have been relatively smooth for most participants.

Although the advantages (convenience) and disadvantages (unable to touch and try items) were described in similar ways, how the different forms of consumption affected consumption behavior differed. For some, impulsive purchases heavily decreased during the pandemic as they did not frequent regular stores as often. Remote working played a role here because several participants mentioned less opportunities to shop when working from home: possibilities for the spontaneous lunch time shopping sprees at city center were removed. For this group of people, shopping online was more carefully planned, thus minimizing spontaneous impulse buys. For others, impulse buying actually increased during the pandemic. Many spent a lot of time online during the pandemic and online, shopping is easily accessible 24/7. A 23-year-old Irish male described spontaneously buying a jacket at 1:00 AM simply because he wanted it. To a 64-year-old Irish woman, online shopping became a "leisure activity" that staved off the boredom during the pandemic.

Some also expressed that their shopping choices had become more strategic during the pandemic. A few of the Swedish participants used to be frequent e-shoppers but because of the pandemic's negative effect on conventional stores they chose to make conscious purchases in physical shops to support the local economy. Supporting the local economy was also brought up as important in Ireland and some participants showed concern that online shopping was turning Dublin into a "ghost town".

As regards transformative potential, above reflections on slower tempo of life, less demand for mobility, shifting consumption, experience of less impulsive buying (among some), and support of local economy, are interesting even though not always motivated by sustainability concerns. Even if the possible sustainability gains due to shifts in consumption are difficult to assess, a greater focus on the home environment may stimulate more durable ways of consumption at least if it reduces demand on (fast) mobility. Indeed, it has been found that the reduction in travel outweighed the increase in household energy consumption (Yao, 2022). In each country, some of the interviewees linked their experiences to environmental benefits, thus indicating a learning experience toward mindful consumption (Echegaray et al., 2021). To be sure, if new workweek habits and the home environment can be realized

3 Spending for communication increased in both countries, whereas more spending related to the home (furniture, household appliances) is clearer in the Swedish context (see Holmberg, 2022), and for Ireland see https://www.cso.ie/en/releasesandpublications/ep/p-elic/economiclifeandcovid-19inireland2020-2021/whatweconsumed/ (accessed May 09, 2022).

4 In Ireland, schools for all age groups were closed intermittently. In Sweden, it was primarily upper secondary schools that were affected.

as a crucial factor to achieve work-life balances, which in turn lead to less consumption and more careful use of resources, this opportunity will have to be facilitated by a range of other policy and infrastructural factors in the local and national context.

Little de-normalization of mass consumption, some ambivalence and reflexivity

The main question in this section is if the effects of the pandemic contributed to discovering and de-normalizing patterns of mass/excess consumption. We do not see much basic questioning of consumer culture in the material but we do see some ambivalence and reflexivity, which may open up some doors for later transformations.

To begin with, and related to above themes, a few participants did describe that the pandemic had led to reflections on the climate crisis in a wider sense. With more spare time to take part of news and reading books, some of these people had started a process to change their lifestyle toward sustainability. One example is a 36-year-old participant who decided to leave work in a restaurant for a career in horticulture, a long-lived dream that the pandemic left room for. In this case, it was not only about consuming less, but in addition, developing new skills and learning to grow food and plants.

In most interviews, however, the normality of mass consumption and air travel was never truly questioned. For instance, the possibility of long-distance vacation travel at least once a year was taken for granted, as well as winter vacations at ski resorts. Shopping trips to the mall or downtown were perceived as a natural part of everyday life, as was gift shopping for birthdays and Christmas. Casually expressing that "one has too many things" without questioning the lifestyle, occurs among participants. A few Irish participants did reflect on the amount of waste they created during the lockdowns, both from eating at home and from excess packaging from online shopping. This, however, was mainly framed as an inconvenience and did not lead to much reflection about mass/excess consumption society.

Although it was not always framed as a questioning of the normality of mass-consumption, some experiences discussed in the previous themes indicate the pandemic did have some impact on the way we perceive our lives. These are indicating some *ambivalence toward consumption*. For instance, the slower pace of life and the chance to reflect on what is important had led several participants to take stock of what they really *need*. As the home became more central in peoples' lives, belongings were experienced in a different way. Some cleared away unnecessary belongings by selling, donating or throwing excess belongings. Even though many participants identified a need for refurbishing and wished to buy new things for their home, others stated that they were satisfied with what they had and felt less need to exchange the old with something new:

> *The desire to get new things must be set aside because there's something bigger going on. You value what you've got. You can cherish being healthy… The realization is that what I've got is good enough. I don't need to buy new things, my belongings have a value that I didn't see before (Interview SE_08).*

Some said they valued their health more than before, others emphasized putting more value on their relationships. One 40-year-old women from Ireland described coming to a such a realization around the time of her daughter's birthday. Before the event, she had been worried that the celebrations would not live up to the daughter's expectations. All the toyshops were closed and, unlikely most other participants, she avoided online shopping as she found it technically difficult. The daughter had also been promised a pirate themed birthday party at play center with her friends but that had to be canceled due to the restrictions. In the end, they ended up celebrating the birthday at home as a family and with a few small gifts from a local shop. Her daughter's reaction was an eye-opener:

> *She still says to this day, "you know mum, that birthday was brilliant" […] So people have it in their heads that they have to buy expensive stuff or really nice brand names. When all the child wanted was to have the day with you painting porcelain (Interview IE_33).*

The woman quoted above says the slower tempo during the pandemic had made her think more about her consumption and what she really needs and values. However, she also stated that as Irish society was starting to open up again, she found herself starting to slip back into old habits. This idea of an outside force pulling you toward consuming was also described by other participants, such as this 27-year-old Swedish man:

> *[…] even though I'm satisfied there's a feeling that maybe I should get something new. It is as if someone is pulling my arms – "remember, what you've got is good enough, but wouldn't it be fun to have something else?". Despite all things happening, there's a pull in the opposite direction saying one should go out and buy something new (Interview SE_08).*

The ambivalence expressed by this person is recurring in several interviews. However, reflectivity is infrequent, and interviewees also express contradictory aspirations. For example, one Swedish person described a wish for a minimalist lifestyle, owning fewer things, yet expressed how cozy it is to go shopping and that a variety of shopping activities is a way of making time with friends.

In the Irish interviews in particular, there is also a clear distinction between how the participants discuss their needs

regarding possession of goods, especially clothing, and their needs for travel. Whilst many had come to some realization that it was wasteful to have more clothes than they would ever wear, few were willing to reduce their travel abroad. This applied even to some of the younger participants who expressed a greater awareness of the negative climate impacts of air travel. One 25-year-old man said "I always envisioned my 20s as the time to see different places. To see different things. Meet new people". The pandemic had put a halt to this, and he was eager to start traveling again. At the same time, he said:

> *I'm very aware of the negative impacts of airline travel. I am trying to offset my emissions and things like that. Yeah, I'm probably going to go on another couple of trips this year, just small trips. After that, hopefully I'll start to become a little bit more conscious again of, I don't know, I guess contributing to the amount of emissions of CO2 (Interview IE28).*

Consumption is intrinsically linked to how much money one can spend. As a result, it is not surprising that the participants whose economic circumstances had changed said that this change had a bigger impact on consumption patterns than the Covid-restrictions. One participant, for example, had recently retired which led to a reduced income. Another had lived with her grandmother, but as this arrangement felt unsafe during the pandemic she moved out, resulting in much higher living costs. With the socially limiting effect of the pandemic, some found new leisure activities and several participants stated that they spent money in new areas of consumption (see above section), but it was also quite common that participants brought up saving money during the pandemic. In the Irish interviews in particular, this was often seen as one of the main benefits of reducing one's consumption and those that did reflect more on how their consumption had changed during the pandemic often framed it in terms of spending their money more wisely now. It was also common in both Ireland and Sweden that people brought up the savings made by working from home as workdays in town are costly with regards to transport, parking fees, lunches, shopping, and a need for more of a variety of clothes, make-up and hair products.

To sum up, even if this material shows little evidence of de-normalization of mass consumption, some *transformative potential* can be linked to experience of ambivalence as well as reflectivity related to earlier themes as well as to feelings of contentment (with what one has) and financial savings. A small minority of participants even made a conscious choice to live more sustainably in a more holistic sense. This minority already had an interest in environmental issues prior to the pandemic, but the pandemic strengthened their concerns and provided a window of opportunity to realize plans. Apart from this minority, there is little to suggest that the pandemic had led to a heightened concern for environmental issues. Even so, the other types of insights related to tempo, relationships, saving, etc. could make a good platform for social transformation. Perhaps most promising is the fact that a few participants did reflect upon the time consumed at work and about people working too much in general in our societies. This potentially shows a willingness to reduce working hours, with reduced household income and level of consumption as a result, in order to gain time to be spent with friends and family.

New competencies and social support: Sticking with individualized adaptation

In the new situation following the pandemic, what we can observe from the material is the mainly individualized adaptation to the societal crisis. We are not suggesting a kind of "rugged individualism" (Perkins et al., 2021) as discussed earlier, rather an approach characterized by business as usual. Problems were usually solved within existing institutions: the market. There was an open and available market for most needs to be met, either by online purchases or conventional purchases. In general, people managed on their own and cared for their family by, for example, grocery shopping for older parents who couldn't go to the store themselves due to restrictions. In Ireland, helping the elderly was in some cases more community based and one participant said she helped elderly neighbors with their shopping. The same participant, a 40-year-old woman, also mentioned that they had arranged street bingo on their street as many older people missed going to the bingo hall and she said the sense of community had strengthened during the pandemic. Utterances like these were rare, however.

Home refurbishing, home decorating projects and car repairs could continue as usual, although some chose to postpone these activities. After all, when perceived necessary, it was possible to carry out. This can be a contributing factor to why thoughts about a sharing economy or circular economy do not appear among participants and do not seem to have caught on during the pandemic. Additionally, in case people wished to borrow, rent, or buy second-hand goods etc., the risk for virus transmission was a natural hinderance. In the Irish case, who one was even *allowed* to let into one's home was heavily restricted at times.

There were a few examples of people repairing things themselves that they probably would not have under other circumstances. For example, one young Irish man said he had become "techier" and learnt to repair some electronic himself and a 62-year-old Irish woman had managed to fix a leaking washing machine herself. Generally speaking, these types of stories were rare and it is possible that central elements of a circular economy, such as repairing or buying used goods, are connected to an idea of lower quality in life. In some cases, participants even showed amusement when asked if they had learned to repair something, perhaps because people are so used

to services for practical help or buying new whenever we want. Repairing belongings used to be a sign you could not afford to buy new. Nowadays, many in both Sweden and Ireland are financially much better off than the previous generation and many positive emotions, as well as social status, can be linked to buying what you wish for. As one of the participants in their 70's expressed:

> *Clothes were expensive in relation to the pay, which resulted in mending things, so that they lasted longer, and it was worth it. When the zipper broke, the item itself was perhaps still good, because it had better quality. It was the same with appliances – they were better. It was worth fixing. And it was expensive buying new compared to repairing (Interview SE_20).*

Except for the general economic development, it was mentioned that things used to be of higher quality. Some of the participants who want to reduce their consumption intended to buy clothes of better quality to be able to keep them longer. One Swedish participant mentioned a wish for businesses where you can drop off things for repair, and a 23-year-old Irish participant had actually had clothes taken in by a tailor as he had lost a lot of weight during the pandemic. He was himself surprised he had taken this action and did not think it would have happened without the pandemic. His main motivation for doing this was to support a local business, showing that this can indeed lead to more sustainable choices at times.

There are some additional examples of changes during the pandemic. Several participants learnt to cut their own or family members hair. In one household, more time was devoted to gardening and learning to reduce household waste by composting. One person planned for self-sufficiency simply because it was fun to be able to do as much as possible on her own. Yet another person, who had gained more free time, went out to pick wild berries and gave it away as gifts. It is interesting and noteworthy that many of these activities are described as positive outcomes of the crisis. It was not linked to poor finances, rather, it related to an increased quality of life and something they wished to continue as it was very rewarding on a personal level. It is mainly there we found most positive signs of learning and transformative potential.

Concluding discussion: Any long-term lifestyle transformation possibilities?

This study stems from knowledge about man exceeding the planetary boundaries. Part of the problem is mass/excess consumption. Mass/excess consumption can be difficult to discover in wealthy societies like Sweden and Ireland, where people regardless of social class, grow up in a context where it is viewed as normal. Some groups try to develop new lifestyles with less consumption, but the norm is that we are supposed to overconsume to keep the economy spinning.

As a consequence of changed weather resulting in floods, wildfires, hurricanes, heat waves, and drought in Europe and other parts of the world during the summer of 2021 and 2022, people lost their homes, belongings and lives. News headlines and broadcasts are now describing what researchers have long claimed; climate change will have severe effects and changes to our society and a transformation of our lifestyle is necessary. Given such circumstances, the discrepancy between the interviewees' limited reflections upon their personal responsibility and the larger picture is quite remarkable.

This study has captured a variety of individual experiences during a time of involuntary disruption of consumption patterns and looked for tendencies, or at least possible readiness, for a transformation toward sustainable lifestyles. What possible long-term lifestyle transformation can we detect by interpreting and analyzing these experiences? In relation to theme one, it is noteworthy that people did not generally long for material objects: they missed meeting people, cultural/sports events, traveling and freedom of movement (see also de Haas et al., 2020; Echegaray, 2021; Moynat et al., 2022). There is learning potential contained here: relations and experiences are most important. The exceptional desire for traveling abroad, which for most interviewees implied flying, does present an obstacle to climate change mitigation. However, several interviewees also came to recognize the value of domestic destinations. This opening – or perhaps rediscovering of the country and local place – of a new alternative is important (Ateljevic, 2020; Benjamin et al., 2020; Hall et al., 2020).

Quite connected, a long-term possibility with findings related to the second theme is that people have discovered new activities at home as well as in outdoor life, and that it is possible to enjoy time spent with relatives, neighbors, and friends doing rather mundane activities such as taking a walk, biking, or making daytrips to lakes and beaches. Several interviewees spoke about positive win-win experiences and insights connected to this: health issues, more easygoing and caring ways of socializing without having to rely on so much consumption.

The greatest long-term possibilities may be connected to the third theme, which encouraged rich responses among the interviewees. That people have become accustomed to and generally appreciated – although far from unanimously – a slower pace of life is an important dimension of wellbeing (Echegaray et al., 2021; Moynat et al., 2022), and it could be an important component to confronting consumerism (Greene et al., 2022). To be sure, the relatively stress-free pandemic existence described by the participants is not representative for all, frontline workers would be the most obvious counter example, and it was not always the case that freeing up time and spending more of it at home led to less consumption. Some participants consumed out of boredom, and some spent more

on goods and services for the home than before. Nonetheless, freed time could stimulate the cultivation of alternatives to consumption: time to reflect, slower and more sustainable options (food, mobility), educating for lifestyle change.

Results connected to the fourth and fifth themes were less promising looking from the perspective of long-term transformative possibilities. Few people in the sample have started to fundamentally question consumer culture. The pandemic seems to have created an enhanced interest for the environment and global climate change among those who already cared for the environment before the pandemic (see also Forno et al., 2022; O'Garra and Fouquet, 2022; Schmidt et al., 2022), but there is little sign of mass consumption being denormalized among the more "mainstream" consumers. This may not be very surprising as they live in contexts where macro-forces (economy, politics, culture) continue to steer the public toward mass consumption patterns. Nevertheless, even among this category of consumers, the COVID-19 pandemic stimulated some consumer reflectivity, which connected more to personal issues like that of financial saving, health matters, unnecessary possessions as well as issues related to above themes: time and relationships (see also Matacena et al., 2021; Moynat et al., 2022). Some reflections were also stimulated by the ambiguities surrounding the experience/understanding of freedom. While people suffered when their freedom of movement was restricted (e.g., purchasing a flight abroad), the restrictions could at the same time open the field of view for other dimensions of freedom (e.g., freeing up time, alternative ways of moving). Such experienced ambiguities could provide important cues for a wider critique of narrow neo-liberal framings that equates freedom to consumer choice and the ability to choose among a larger span of commodities for sale on a market (including traveling options).

The fifth theme was the one with least signs of transformative potential. Perhaps unsurprisingly – community life was after all restricted – there were few examples of collective ways of helping each other. Even if people expressed that the pandemic had facilitated a care for others in their thoughts and by some action, they, like before, employed individual (commoditized) solutions when practical problems appeared. There are examples shown in the interviews about making repairs, borrowing things, growing own food, and improved DIY-competence. These examples are, however, exceptions and thoughts about a sharing economy, circular economy and similar concepts do not appear to have spread among participants. Buying new is still the norm.

Seen together, these long-term lifestyle transformation possibilities are perhaps not overly impressive, but neither are they insignificant or irrelevant. Some practices in relation to eating, mobility, shopping, leisure, and work will likely stay (online shopping/entertainment/socializing, homebody practices, see e.g., Ehgartner and Boons, 2020; Shamshiripour et al., 2020; Echegaray, 2021; Perkins et al., 2021; Pomponi et al., 2021). Because the pandemic has lasted a long time, new practices get sufficient time to bolster, and once you have changed practices there is a resistance to change back again (de Haas et al., 2020). Other practices, fueled by the pre-existing and very forceful macro-institutional structures of mass consumption, have already "bounced back to normal" (see Boström, 2021b), since the restrictions were removed. Clearly in these cases there would be a need for several system-level changes in order to sustain temporary changes of habits. Nonetheless, the impetus for system change could rely on some important learning experiences among the public. Even though people expected return to normal as regards consumption, the everyday experiences around what the disruption caused will sustain in collective memories. Such a *collective memory* offers an opportunity for politics, policy, civil society, social movements, and new economies to think differently and try out alternatives and remind about what was once possible. For the purpose here, we narrow down the topic to address two types of responses that open up some possibilities, first some embryonic transformative learning gained by experiences of ambiguity and reflexivity and second the fostering of adaptative abilities.

First, sustainable consumer practices will arguably require a deeper, more demanding and long-term process of self-learning of lifestyle practices. We here get back to the concept of transformative learning that was introduced in the theory section. There is not much evidence of fundamental challenging of frames of references and "habits of mind" in the material among this sample of mainstream consumers. Hence, we cannot see plenty of transformative learning in the interview material. Nevertheless, some of the experiences and new insights (around personal consumption, slower pace of life, freeing up time, the importance of social relations, financial saving, satisfaction of what one has) can provide initial learning points that paves ground for more basic questioning of "habits of mind". Experiences of ambiguities, even inner contradictions, may lead to feelings of uneasiness, and such dissonance can in turn be a constructive force behind change (Ojala, 2016). There are some expressions of contradictions and ambivalence in relation to consumption among the participants, for example an awareness that new purchases are often unnecessary and damaging, but when you live in a social context where consumption is central, you buy, regardless. Change will certainly not happen automatically from the individual but require a large dose of external incitements: carrots, sticks, norms, reference groups, social and community support, and better coverage of the problem of mass consumption in news media.

Second, an important observation with huge policy-implications is that around adaptative abilities (Strömblad et al., 2021; Hoolohan et al., 2022). The interviews indeed reveal that people relatively easy adapted to the situation during the pandemic with covid-related restrictions. Noteworthy is also that they generally legitimized the restrictions, hence top-down governance. Based on this observation, we can argue there is a

possibility that people have expressed and fostered an adaptative ability, not totally unlike the kind that might be needed for ecological and climate adapted lifestyles. If things turn worse, people have shown they can adapt as well as accept restrictions. On the individual level, some households saved money during the pandemic when they reduced their consumption, sometimes with an aim to bolster individual resilience. Also, we must not forget how above-mentioned positive experiences and the reconceptualizing of wellbeing can facilitate adaptative abilities. This topic is an important area for further research, particularly such using qualitative methodology and longitudinal design to capture how experiences, learning, and practices of various groups of people/communities evolve over time (see Boström, 2022 for an example).

Acceptance of restricting measures may rely on the expected time frame; that is, seeing the disruption as temporary or permanent. The COVID-19 crisis shows that in a crisis situation, governments can mandate deep lifestyle changes, with the assumption that this was for a limited period of time (Echegaray et al., 2021). The pandemic was seen as an urgent, fast threat for all social segments in society causing immediate motivation to act whereas climate change tends to be considered an abstract, slow, future-distant threat (Lidskog et al., 2020; Heyd, 2021). In face of expected climate change, privileged groups/societies may perceive they have available resources to gradually adapt to changing circumstances without the need of macro-structural change. If we want to see structural changes, the threat needs to be perceived as immediate, also among the more already privileged groups in society. The alternative must appear (more) attractive (than the existing crisis) and give people a sense of wellbeing. Although we are still far from a situation in which the general public, motivated by climate change arguments, is ready to accept and adapt to very significant restrictions and further de-normalizing consumer society, we should not rule out the possibilities of a gradually increased public readiness to legitimize such restrictions, particularly if various types of crises (disruptions) return with increased regularity. In a Dutch study it was found that more than 90% of respondents thought the pandemic crisis will have large, long-term impacts on society (de Haas et al., 2020). The very existence of such beliefs – and now people add the Russian war on Ukraine, high inflation, and ever-recurring climate-related crises like the drought and forest fires in Central and Southern Europe summer of 2022 to the bank of experience – could mean that people adapt to a presumed long-term scenario, making the scenario becoming real exactly because of this adaptation. Studying if such broader legitimacy evolves is an important area of longitudinal research.

At the end of the day, while some changed practices at the time of the pandemic will likely remain (like blurring of home and work), there are other temporary changes during the pandemic that will need much external encouragement if changed practices are to continue, including material/technological/infrastructural support by governments and other collective actors (Echegaray et al., 2021; Forno et al., 2022; Hoolohan et al., 2022), including measures such as workweek reduction and the role of workplace as time-ordering institutions (Boström, 2021b; Greene et al., 2022). For instance, one of the conditions for long term adaptation to transformed lifestyles and smaller ecological footprints is to create infrastructures (for energy, transportation, food provision, housing, workhours) that enable people to live sustainable while also enjoying quality of life. Here are also important roles for civil society, for example to stimulate activities and spread ideas and skills in the areas of gardening, sharing, repairing, and local recreation. There is certainly no lack of research opportunities as regards the problem how society, community, policy, and lifestyle dynamics can fruitfully interact to achieve the kind of transformative change that human societies urgently need to be able to survive and live well on the planet.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. The patients/participants provided their written informed consent to participate in this study.

Author contributions

MB designed the study, conducted and wrote the theoretical framework including literature review, wrote the introduction and concluding section, and contributed to the other sections. HR conducted the Swedish interviews, wrote parts of the method and empirical analysis section, and contributed to the other sections. LS conducted the Irish interviews, wrote parts of the method and empirical analysis section, and contributed to the other sections. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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References

Aktar, M. A., Alam, M. d. M., and Al Amin, A. Q. (2021). Global economic crisis, energy use, CO2 emissions, and policy roadmap amid COVID-19. *Sustain. Prod. Consumpt.* 26, 770–781. doi: 10.1016/j.spc.2020.12.029

Almeida, C. M. V. B., Gianetti, B. F., Agostinho, F., Liu, G., and Yang, Z. (2021). What are the stimuli to change to a sustainable post-COVID-19 society? *Sustainability* 13, 12939. doi: 10.3390/su132312939

An Garda Síochána (2021). *Coronavirus (COVID-19).* Available online at: https://www.garda.ie/en/about-us/our-departments/office-of-corporate-communications/news-media/news-archive/coronavirus-covid-19-1-3-20-.html (accessed July 14, 2022).

Ateljevic, I. (2020). Transforming the (tourism) world for good and (re)generating the potential 'new normal'. *Tour. Geograph.* 22, 467–475. doi: 10.1080/14616688.2020.1759134

Babbitt, C. W., Babbitt, G. A., and Oehman, J. M. (2021). Behavioral impacts on residential food provisioning, use, and waste during the COVID-19 pandemic. *Sustain. Prod. Consumpt.* 28: 315–325. doi: 10.1016/j.spc.2021.04.012

Bauman, Z. (2007). *Consuming Life.* Cambridge: Polity Press.

Belk, R. W., Ger, G., and Askegaard, S. (2003). The fire of desire: A multisited inquiry into consumer passion. *J. Consu. Res.* 30, 326–351 doi: 10.1086/378613

Benjamin, S., Dillette, A., and Alderman, D. H. (2020). "We can't return to normal": committing to tourism equity in the post-pandemic age. *Tour. Geograph.* 22, 476–483. doi: 10.1080/14616688.2020.1759130

Bergantino, A. S., Intini, M., and Tangari, S. (2021). Influencing factors for potential bike-sharing users: an empirical analysis during the COVID-19 pandemic. *Res. Transp. Econ.* 86, 101028. doi: 10.1016/j.retrec.2020.101028

Bin, E., Andruetto, C., Susilo, Y., and Pernestål, A. (2021). The trade-off behaviours between virtual and physical activities during the first wave of the COVID-19 pandemic period. *Euro. Transp. Res. Rev.* 13, 1–19. doi: 10.1186/s12544-021-00473-7

Bohman, H., Ryan, J., Stjernborg, V., and Nilsson, D. (2021). A study of changes in everyday mobility during the COVID-19 pandemic: As perceived by people living in Malmö, Sweden. *Transp. Policy* 106, 109–119. doi: 10.1016/j.tranpol.2021.03.013

Borsellino, V., Kaliji, S. A., and Schimmenti, E. (2020). COVID-19 drives consumer behaviour and agro-food markets towards healthier and more sustainable patterns. *Sustainability* 12, 1–26. doi: 10.3390/su12208366

Boström, M. (2020). The social life of mass and excess consumption. *Environ. Sociol.* 6, 268–278. doi: 10.1080/23251042.2020.1755001

Boström, M. (2021a). Social relations and everyday consumption rituals: Barriers or prerequisites for sustainability transformation? *Front. Sociol.* 6, 723464. doi: 10.3389/fsoc.2021.723464

Boström, M. (2021b). Take the opportunity afforded by the COVID-19 experiences: progressive non-growth policies for sustainable lifestyles. *Front. Sustain.* 2, 726320. doi: 10.3389/frsus.2021.726320

Boström, M. (2022). Lifestyle transformation and reduced consumption: a transformative learning process. *Sozialpolitik.ch* 2022, 1–2. doi: 10.18753/2297-8224-186

Boström, M., Andersson, E., Berg, M., Gustafsson, K., Gustavsson, E., Hysing, E., et al. (2019). Conditions for transformative learning for sustainable development: a theoretical review and approach. *Sustainability* 10, 4479. doi: 10.3390/su10124479

Central Statistics Office. (2021). *Business Impact of COVID-19 on SMEs 2020.* Available online at: https://www.cso.ie/en/releasesandpublications/ep/p-bics/businessimpactofcovid-19onsmes2020/adaptingandremoteworking/ (accessed July 14, 2022).

Cherrier, H., M., Szuba, and N. and Özçaglar-Toulouse, N. (2012). Barriers to downward carbon emission: Exploring sustainable consumption in the face of the glass floor. *J. Market. Manage.* 28, 397–419. doi: 10.1080/0267257X.2012.658835

Cohen, M. J. (2020). Does the COVID-19 outbreak mark the onset of a sustainable consumption transition? *Sustainability.* 16, 1–3. doi: 10.1080/15487733.2020.1740472

Collins, R. (2005). *Interaction Ritual Chains.* Princeton: Princeton University Press.

Collins, R., and Welsh, K. (2022). The road to "local green recovery": Signposts from COVID-19 lockdown life in the UK. *Area.* 54, 451–459. doi: 10.1111/area.12780

Cosgrove, K., Vizcaino, M., and Wharton, C. (2021). COVID-19-related changes in perceived household food waste in the united states: A cross-sectional descriptive study. *Int. J. Environ. Res. Public Health.* 18, 1–11. doi: 10.3390/ijerph18031104

Dartnell, L. R., and Kish, K. (2021). Do responses to the COVID-19 pandemic anticipate a long-lasting shift towards peer-to-peer production or degrowth? *Sustain. Prod. Consumpt.* 27, 2165–2177. doi: 10.1016/j.spc.2021.05.018

De Groot, J., and Lemanski, C. (2020). COVID-19 responses: infrastructure inequality and privileged capacity to transform everyday life in South Africa. *Environ. Urbaniz.* 33, 255–272 doi: 10.1177/0956247820970094

de Haas, M., Faber, R., and Hamersma, M. (2020). How COVID-19 and the Dutch 'intelligent lockdown' change activities, work and travel behaviour: Evidence from longitudinal data in the Netherlands. *Transp. Res. Interdiscipl. Perspect.* 6, 100150. doi: 10.1016/j.trip.2020.100150

de Medeiros, J. F., Marcon, A., Ribiero, J. L. D., Quist, J., and D'Agostin, A. (2021). Consumer emotions and collaborative consumption: The effect of COVID-19 on the adoption of use-oriented product-service systems. *Sustain. Prod. Consumpt.* 27, 1569–1588. doi: 10.1016/j.spc.2021.03.010

Dittmar, H. (2008). *Consumer Culture, Identity and Well-Being.* The Search for the 'Good Life' and the 'Body Perfect'. New York: Psychology Press.

Echegaray, F. (2021). What POST-COVID-19 lifestyles may look like? Identifying scenarios and their implications for sustainability. *Sustain. Prod. Consumpt.* 27, 567–574. doi: 10.1016/j.spc.2021.01.025

Echegaray, F., Brachya, V., Vergragt, P. J., and Zhang, L. (2021). *Sustainable Lifestyles After COVID-19.* London: Routledge. doi: 10.4324/9781003162391

Ehgartner, U., and Boons, F. (2020). *COVID-19 and Practice Change in the Everyday Life Domains of Hygiene, Eating, Mobility, Shopping, Leisure and Work: Implications for Environmental and Social Sustainability.* Manchester: Sustainable Consumption Institute.

Eisenmann, C., Nobis, C., Kolarova, V., Lenz, B., and Winkler, C. (2021). Transport mode use during the COVID-19 lockdown period in Germany: The car became more important, public transport lost ground. *Transp. Policy* 103, 60–67. doi: 10.1016/j.tranpol.2021.01.012

Esposti, P. D., Mortara, A., and Roberti, G. (2021). Sharing and sustainable consumption in the era of covid-19. *Sustainability* 13, 1–15. doi: 10.3390/su13041903

Filimonau, V., Vi, L. H., Beer, S., and Ermolaev, V. A. (2021). The Covid-19 pandemic and food consumption at home and away: An exploratory study of English households. *Socio-Econ. Plann. Sci.* 82, 101125. doi: 10.1016/j.seps.2021.101125

Forno, F., Laamanen, M., and Wahlen, S. (2022). (Un-)sustainable transformations: everyday food practices in Italy during COVID-19. *Sustainability* 18, 201–214. doi: 10.1080/15487733.2022.2037341

Gojard, S., and Veron, B. (2018). Shifts in provisioning routines: do holidays favour more local and seasonal food purchases? *Environ. Sociol.* 5, 283–293. doi: 10.1080/23251042.2018.1546805

Government of Ireland (2022). *Updates on COVID-19 (Coronavirus) since January 2020*. Available online at: https://www.gov.ie/en/publication/20f2e0-updates-on-covid-19-coronavirus-since-january-2020/ (accessed July 14, 2022).

Government Offices of Sweden (2022). *Regeringens arbete med coronapandemin*. Available online at: https://www.regeringen.se/regeringens-politik/regeringens-arbete-med-coronapandemin/ (accessed July 14, 2022).

Greene, M., Hansen, A., Hoolohan, C., Süßbauer, E., and Domaneschi, L. (2022). Consumption and shifting temporalities of daily life in times of disruption: undoing and reassembling household practices during the COVID-19 pandemic. *Sustainability* 18, 215–230. doi: 10.1080/15487733.2022.2037903

Hagbert, P., and Bradley, K. (2017). Transitions on the Home Front: A Story of Sustainable Living beyond Ecoefficiency. *Energy Res. Soc. Sci.* 31, 240–248. doi: 10.1016/j.erss.2017.05.002

Hall, C. M., Scott, D., and Gössling, S. (2020). Pandemics, transformations and tourism: be careful what you wish for. *Tour. Geograph.* 22, 577–598. doi: 10.1080/14616688.2020.1759131

Hand, M., Shove, E., and Southerton, D. (2007). Home extensions in the United Kingdom: space, time and practice. *Environ. Planning D* 25, 668–681 doi: 10.1068/d413t

Heyd, T. (2021). Covid-19 and climate change in the times of the Anthropocene. *Anthropocene Rev.* 8, 21–36. doi: 10.1177/2053019620961799

Holmberg, U. (2022). Konsumtionsrapporten 2021 Gothenburg: Centrum för konsumtionsforskning, Centre for Retailing, Handelshögskolan vid Göteborgs Universitet. Available online at: https://www.gu.se/sites/default/files/2021-12/TE_konsumtionsrapporten%202021_korr.pdf (accessed July 14, 2022).

Hoolohan, C., Wertheim-Heck, S. C. O., Devaux, F., Domaneschi, L., Dubuisson-Quellier, S., Schäfer, M., et al. (2022). COVID-19 and socio-materially bounded experimentation in food practices: insights from seven countries. *Sustainability* 18, 16–36. doi: 10.1080/15487733.2021.2013050

Huang, H. L., Chen, Y. Y., and and, Sun, S. C. (2022). Conceptualizing the internet compulsive-buying tendency: what we know and need to know in the context of the COVID-19 pandemic. *Sustainability* 14, 1549. doi: 10.3390/su14031549

Jackson, T. (2017). *Prosperity Without Growth. Foundations for the Economy of Tomorrow, 2nd Edn*. London: Routledge.

Jiang, P., Van Fan, Y., and Klemes, J. J. (2021). Impacts of COVID-19 on energy demand and consumption: Challenges, lessons and emerging opportunities. *Appl. Energy.* 285, 116441. doi: 10.1016/j.apenergy.2021.116441

Jribi, S., Shin, E., and Kim, H. (2020). COVID-19 virus outbreak lockdown: What impacts on household food wastage? *Environ. Develop. Sustain.* 22, 3939–3955. doi: 10.1007/s10668-020-00740-y

Kanda, W., and Kivimaa, P. (2020). What opportunities could the COVID-19 outbreak offer for sustainability transitions research on electricity and mobility? *Energy Res. Soc. Sci.* 68, 101666. doi: 10.1016/j.erss.2020.101666

Kempen, E., and Tobias-Mamina, R. J. (2022). Applying behavioral reasoning theory to South African female consumers' emerging apparel-shopping behavior during COVID-19. *J. Global Fashion Market*. 13, 221–237 doi: 10.1080/20932685.2022.2033632

Kirk, C. P., and Rifkin, L. S. (2020). I'll trade you diamonds for toilet paper: Consumer reacting, coping and adapting behaviors in the COVID-19 pandemic. *J. Bus. Res.* 117, 124–131. doi: 10.1016/j.jbusres.2020.05.028

Knight, K. W., Rosa, E. A., and Schor, J. B. (2013). Could working less reduce pressures on the environment? A cross-national panel analysis of OECD countries, 1970-2007. *Global Environ. Change* 23, 691–700. doi: 10.1016/j.gloenvcha.2013.02.017

Kotler, P. (2020). The consumer in the age of coronavirus. *J. Creating Value.* 6, 12–15. doi: 10.1177/2394964320922794

Lidskog, R., Elander, I., and Standring, A. (2020). COVID-19, the climate, and transformative change: comparing the social anatomies of crises and their regulatory responses. *Sustainability* 12, 6337. doi: 10.3390/su12166337

Lõhmus, M., Stenfors, C. D. U., Lind, T., Lauber, A., and Georgelis, A. (2021). Mental health, greenness, and nature related behaviors in the adult population of stockholm county during covid-19-related restrictions. *Int. J. Environ. Res. Public Health* 18, 3303. doi: 10.3390/ijerph18063303

Lotz-Sisitka, H., Wals, A., Kronlid, D., and McGarry, D. (2015). Transformative, transgressive social learning: Rethinking higher education pedagogy in times of systemic global dysfunction. *Curr. Opin. Environ. Sustain.* 16, 73–80. doi: 10.1016/j.cosust.2015.07.018

Matacena, R., Zenga, M., D'Addario, M., Mari, S., and Labra, M. (2021). COVID-19 as an opportunity for a healthy-sustainable food transition. An analysis of dietary transformations during the first Italian lockdown. *Sustainability* 13, 5661. doi: 10.3390/su13105661

Mezirow, J. (2009). "An overview on transformative learning," in K. Illeris (ed.) *Contemporary theories of learning. Learning theorists… in their own words* (London: Routledge). p. 90–105.

Miller, D. (1998). *A Theory of Shopping.* Cambridge: Polity Press

Miller, D. (2010). *Stuff.* Cambridge: Polity Press.

Monzón-Chavarrías, M., Guillén-Lambea, García-Pérez, S., Monialegre-Gracia, A. L., and Sierra-Pérez, J. (2021). Heating energy consumption and environmental implications due to the change in daily habits in residential buildings derived from COVID-19 crisis: The case of Barcelona, Spain. *Sustainability* 13, 1–19. doi: 10.3390/su13020918

Moynat, O., Volden, J., and Sahakian, M. (2022). How do COVID-19 lockdown practices relate to sustainable well-being? Lessons from Oslo and Geneva. *Sustainability.* 18, 309–324. doi: 10.1080/15487733.2022.2051350

Nemes, G., Chiffoleau, Y., Zollet, S., Collison, M., Benedek, Z., Colantuono, F., et al. (2021). The impact of COVID-19 on alternative and local food systems and the potential for the sustainability transition: Insights from 13 countries. *Sustain. Prod. Consumpt.* 28, 591–599. doi: 10.1016/j.spc.2021.06.022

O'Garra, T., and Fouquet, R. (2022). Willingness to reduce travel consumption to support a low-carbon transition beyond COVID-19. *Ecol. Econ.* 193, 107297. doi: 10.1016/j.ecolecon.2021.107297

Ojala, M. (2016). Facing anxiety in climate change education: From therapeutic practice to hopeful transgressive learning. *Canad. J. Environ. Educ.* 21, 41–56.

Orîndaru, A., Popescu, M.-F., Caescu, S. C., Botezatu, F., Florescu, M. S., and Ronceanu-Albu, C.-C. (2021). Leveraging covid-19 outbreak for shaping a more sustainable consumer behavior. *Sustainability* 13, 5762. doi: 10.3390/su13115762

Perkins, K. M., Munguia, N., Ellenbecker, M., Moure-Eraso, R., and Velazquez, L. (2021). COVID-19 pandemic lessons to facilitate future engagement in the global climate crisis. *J. Clean. Prod.* 290, 125178. doi: 10.1016/j.jclepro.2020.125178

Pomponi, F., Li, M., Sun, Y. Y., Malik, A., Lenzen, M., and Fountas, G. (2021). A novel method for estimating emissions reductions caused by the restriction of mobility: The case of the COVID-19 pandemic. *Environ. Sci. Technol. Lett.* 8, 46–52. doi: 10.1021/acs.estlett.0c00764

Public Health Agency of Sweden (2022). Föreskrifter och allmänna råd – covid-19. Available online at: https://www.folkhalsomyndigheten.se/smittskydd-beredskap/utbrott/aktuella-utbrott/covid-19/foreskrifter-och-allmanna-rad/ (accessed July 14, 2022).

Richins, M. L. (1994). Valuing things: the public and private meanings of possessions. *J. Consu. Res.* 21, 504–521. doi: 10.1086/209414

Rinkinen, J., Shove, E., and Marsden, G. (2021). *Conceptualising Demand. A Distinctive Approach to Consumption and Practice.* New York: Earthscan/Routledge. doi: 10.4324/9781003029113

Rook, D. (1985). The ritual dimension of consumer behavior. *J. Cons. Res.* 12, 251–264. doi: 10.1086/208514

Sahakian, M. (2017). "Constructing normality through material and social lock-on: the dynamics of energy consumption among Geneva's more affluent households," in A. Hui, R. Day, and G. Walker. *Demanding Energy. Space, Time, and Change* (Basingstoke: Palgrave Macmillan). p. 51–71. doi: 10.1007/978-3-319-61991-0_3

Sassatelli, R. (2007). *Consumer Culture. History, Theory and Politics*. London: Sage. doi: 10.4135/9781446212684

Schmidt, K., Wallis, H., Sieverding, T., and Matthies, E. (2022). Examining COVID-19-Related Changes toward More Climate-Friendly Food Consumption in Germany. *Sustainability* 14, 4267. doi: 10.3390/su14074267

Schor, J. (1998). *The Overspent American. Why We Want What We Don't Need*. New York, NY: Harper.

Schor, J. (2005). *Born to Buy*. New York, NY: Scribner.

Schor, J., and Thompson, C. J. (2014). *Sustainable Lifestyles and the Quest for Plenitude: Case Studies of the New Economy*. Yale: Yale University Press.

Severo, E. A., De Guimaraes, J. C. F., and Dellarmelin, M. L. (2021). Impact of the COVID-19 pandemic on environmental awareness, sustainable consumption and social responsibility: Evidence from generations in Brazil and Portugal. *J. Cleaner Prod.* 286, 124947. doi: 10.1016/j.jclepro.2020.124947

Shamshiripour, A., Rahimi, E., Shabanpour, R., and Mohammadian, A. (2020). How is COVID-19 reshaping activity-travel behavior? Evidence from a comprehensive survey in Chicago. *Transp. Res. Interdisc. Perspect.* 7, 100216. doi: 10.1016/j.trip.2020.100216

Sheth, J. (2020). Impact of Covid-19 on consumer behavior: Will the old habits return or die? *J. Bus. Res.* 117, 280–283. doi: 10.1016/j.jbusres.2020.05.059

Shove, E. (2010). Beyond the ABC: climate change policy and theories of social change. *Environ. Plann. A* 42, 1273–1285. doi: 10.1068/a42282

Sofo, A., and Sofo, A. (2020). converting home spaces into food gardens at the time of COVID-19 quarantine: all the benefits of plants in this difficult and unprecedented period. *Hum. Ecol. Interdiscip. J.* 48, 131–139. doi: 10.1007/s10745-020-00147-3

Spaargaren, G. (2011). Theories of Practices: Agency, Technology, and Culture: Exploring the Relevance of Practice Theories for the Governance of Sustainable Consumption Practices in the New World-Order. *Global Environ. Change* 21, 813–822. doi: 10.1016/j.gloenvcha.2011.03.010

Statistics Sweden (2021). *Allt fler jobbar hemifrån* [press release]. Available online at: https://www.scb.se/pressmeddelande/allt-fler-arbetar-hemifran/ (accessed July 14, 2022).

Steffen, W., Richardson, K., Rockström, J., Cornell, S. E., Petzer, I., Bennett, E. M., et al. (2015). Planetary boundaries: Guiding human development on a changing planet. *Science* 347, 1259855. doi: 10.1126/science.1259855

Strömblad, E., Winslott Hiselius, L., Smidfelt Rosqvist, L., and Svensson, H. (2021). Adaptive travel behaviors to cope with covid-19: A swedish qualitative study focusing on everyday leisure trips. *Sustainability* 13, 12979. doi: 10.3390/su132312979

Tchetchik, A., Kaplan, S., and Blass, V. (2021). Recycling and consumption reduction following the COVID-19 lockdown: The effect of threat and coping appraisal, past behavior and information. *Resour. Conserv. Recycl.* 167, 105370. doi: 10.1016/j.resconrec.2020.105370

Wilk, R. (2002). Consumption, human needs, and global environmental change. *Global Environ. Change* 12, 5–13. doi: 10.1016/S0959-3780(01)00028-0

Yao, Y. (2022). How does COVID-19 affect the life cycle environmental impacts of U.S. household energy and food consumption? *Environ. Res. Lett.* 17, 034025. doi: 10.1088/1748-9326/ac52cb

Zhang, J., Hayashi, Y., and Frank, L. D. (2021). COVID-19 and transport: Findings from a world-wide expert survey. *Transp. Policy* 103, 68–85. doi: 10.1016/j.tranpol.2021.01.011

Zwanka, R. J., and Buff, C. (2020). COVID-19 Generation: A Conceptual Framework of the Consumer Behavioral Shifts to Be Caused by the COVID-19 Pandemic. *J. Int. Consum. Market.* 33, 58–67. doi: 10.1080/08961530.2020.1771646

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Sustainable consumption through policy intervention—A review of research themes

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Policy-makers are starting to acknowledge the urgent need for policy-intervention to achieve sustainable consumption. However, it is difficult to achieve policy-making that leads to impactful consumption interventions. Generally speaking, sustainable consumption can be achieved in three ways; to reduce consumption, to change consumption, and to improve consumption. These strategies all have their advantages and disadvantages regarding the likelihood for impactful policies to be implemented. Prior research identifies policies with big impact potential for all three of these strategies, but also clearly shows that none of the three strategies has so far been successfully applied to achieve sustainable consumption. Indeed, success remains elusive in each of the strategies to adopt the most impactful policies available due to limited implementability. The goal of this article is to provide a broad overview of research on sustainable consumption and to discuss future directions for research.

KEYWORDS

sustainable consumption, policy intervention, policy package, reduce, change, improve

Introduction

The ongoing environmental crisis and the growing socio-economic disparities between different population groups are among humanity's greatest challenges. These problems stem from the unsustainable patterns of consumption we find in societies all over the world, especially in the more affluent sections of the population (Wiedmann et al., 2020). International agreements such as the 2030 Agenda and the Paris Agreement set ambitious goals and strategies for more sustainable societies. Goal 12 of the UN Sustainable Development Agenda 2030 (SDG 12) calls for responsible consumption and production, which aims to "do more and better with less" to improve quality of life and to leave no one "behind" (UN DESA, 2016). But the question is whether it is possible to achieve the profound systemic changes needed to address the negative consequences of human activities in less than a decade (Alfredsson et al., 2018).

Introducing an effective policy mix for sustainable consumption is a huge task. A sustainable level of consumption will ensure a dignified life for the entire population of the world (Raworth, 2012, 2017) within planetary boundaries (Rockström et al., 2009; Steffen et al., 2015). Some argue that this is only possible by reducing growth (Kallis, 2019). Given the level of necessary upheaval to current living standards most people in

the West would have to forgo in terms of income and consumption (Milanovic, 2021), this is hardly something that can be achieved without profound social change and a new approach to consumption—where we need to rethink our attitudes about lifestyles and the role of consumption in our lives, quality of life, and the "good life." Therefore, much broader societal dialogue, visions of the future and roadmaps are needed for a transformative change that has an absolute decoupling between consumption and environmental impact as a starting point—or even as an absolute condition—for the future development toward sustainable consumption and sustainable lifestyles.

While policy-makers have identified the importance of consumption to limit carbon emissions, consumption-oriented environmental policy-making has remained largely unsuccessful in bending the trend of increased consumption-related carbon emissions. This is despite an abundance of policy-tools available. However, sustainable consumption is also a politically sensitive policy arena as it challenges the status quo, and therefore also the reigning consumer paradigm as well as powerful economic interests. Policies that are easy to implement often have limited impact. Thus, policy-making for sustainable consumption currently stands at an impasse where policies often appear to be either impactful or implementable, but rarely both.

Sustainable consumption as an environmental policy arena

The development of policies and the research discourse on sustainable consumption are intertwined with policy developments in sustainable production. Unsustainable consumption and production patterns were identified as the main cause of environmental degradation already at the Rio Earth Summit in 1992, when Agenda 21 and the Rio Declaration were signed by more than 178 governments as non-binding action plans for sustainable development (UNCED, 1992). These were revised in 2002, at the Johannesburg World Summit for Sustainable Development, where sustainable consumption and production were adopted as a key goal and requirement for sustainable development (UN, 2002). There, the decision was taken to establish a 10-year framework for programmes in support of regional and national initiatives to accelerate the transition to sustainable consumption and production (10YFP). In 2015, UN member states set the 17 Global Goals and 169 detailed SDGs intended to be achieved by 2030. Objective eight aims to decouple economic growth from resource use and environmental degradation, in particular through improved resource efficiency, while maintaining people's well being (UN DESA, 2016). SDG 12 calls for a shift to sustainable consumption and production in developed and developing countries, which is mostly about doing more and better with less resources. The Paris Agreement, which entered into force in 2016, commits all countries that have signed and ratified the agreement to implement measures to keep the temperature increase well below two degrees from 2020 onwards. The agreement stipulates that "sustainable lifestyles and sustainable consumption and production patterns play an important role in addressing climate change." One of the main objectives of the new UN Consumer Protection Guidelines of 2016 was also to promote sustainable consumption.

Sustainable consumption as an environmental policy area is cross-sectoral, which means that it has not had a natural political home. It has been considered to be at the intersection of consumer and environmental policy (Mont and Dalhammar, 2005). Sustainable consumption is thus a relevant issue both for those who work with consumer issues and those who deal with environmental issues. It concerns strategies and policy instruments in many different environmental policy areas, which means "administrative fragmentation"[1] with regard to different geographical scales, time scales, as well as specific problem areas, as well as the interaction between different areas such as national vs. local governance (Heiskanen et al., 2014). There is a plethora of policy instruments that relate to consumption, in different ways, and they can be adopted at different levels (both at the EU level, nationally and locally). The policy instruments and laws relating to sustainable consumption are under different directorates-general of the European Commission. We also see how new environmental policy areas such as Circular Economy have a strong element of consumption-oriented measures ("right to repair," product labeling, long-lived products, etc.,), and how recommendations to make economies more "circular" include many measures that aim to reduce or change consumption (Circle Economy RISE, 2022).

The implications of the above include:

- It is not easy to separate a policy of sustainable consumption, or instruments for sustainable consumption, from other environmental policy areas.
- Many environmental policy areas, such as climate policy and the work toward a circular economy, are increasingly focusing on consumer issues.

It is an open question whether "sustainable consumption" should be treated as its own area of sustainability policy, with its own objectives, or whether consumption issues should be integrated into other policy areas. Right now, the situation is that many nations that work actively with sustainable consumption simultaneously apply both of these strategies.

This article sets out to map current literature streams in order to identify policy-making that allows for the successful implementation of impactful consumption-oriented action and point to future research needs to identify the

1 For a discussion of the term see for example (Scharin, 2018).

TABLE 1 Different ways to categorize steps in the transition to sustainable consumption.

Our terminology	UNEP (2001)	Geels et al. (2015)	Creutzig et al. (2018)	Akenji et al. (2021)
Improve	Different	Reformist	Enhance	Improve
Change	Conscious	Reconfiguration	Shift	Shift
Reduce	Appropriate	Revolutionary	Avoid	Reduce

best policy-mixes for successful policy-making in achieving sustainable consumption.

Materials and methods

The method for this paper can be described as an integrative literature analysis. Integrative literature analysis is a form of research that examines, criticizes, and synthesizes representative literature on a specific topic in an integrated way so that new conceptual frameworks and perspectives are generated (Torraco, 2005). Literature searches using relevant keywords have been done in Scopus, Web of Science, Google Scholar, and LUBSearch. Keywords in English and Swedish have been used, including e.g., "sustainable consumption," "weak and strong sustainable consumption" and specific areas described in various sections, such as "sufficiency," "segmentation," "advertising," "social innovation," "eco-label," "de-growth," "sustainable lifestyles," etc. Keywords have included: [TITLE-ABS-KEY ("sustainable consumption") AND ALL (meta-analysis) OR TITLE-ABS-KEY ("systematic literature review") AND TITLE-ABS-KEY (policy)]. Searches have also been carried out through relevant websites and databases, e.g., the Swedish Environmental Protection Agency, the Nordic Council of Ministers, the OECD, the European Commission and others. In order to make the task more manageable, meta-studies as well as studies where a systematic literature analysis has been carried out, have been used. For specific subcategories—such as the collaborative economy, circular economy, sustainable business models, nudging, etc.—specific searches for relevant keywords have been conducted within each section.

Results

The current state of research on sustainable consumption

Several strategies have been proposed to achieve sustainable consumption. Most classifications of them distinguish three levels. For example, an influential UNEP report from 2001 distinguished between "different" consumption to be achieved through government measures and investments, "conscious" consumption to be achieved through changes in consumer behavior, and "appropriate" consumption to be achieved through a deep and broad debate in society about consumption patterns and levels of consumption, as well as quality of life (UNEP, 2001). Another conceptualization is the avoid-shift-enhance framework like Creutzig et al. (2018) propose. These were developed in the early 1990s in Germany, to structure policies that reduce the environmental impact of transportation. When it comes to the study of transition processes toward sustainability, Geels et al. (2015) suggest a distinction should be made between reformist, reconfigured and revolutionary approaches. Akenji et al. (2021) distinguish between reduce-shift-improve as different options for change toward a lifestyle that can be reconciled with the 1.5-degree goal. In Table 1 we summarize the concepts and how we use them in this article.

Improve—means that individuals consume better alternatives of the same goods and services they already consume, e.g., eco-labeled, organic, energy-efficient, ethical or locally produced goods. Better consumption is about the consumption of more environmentally efficient or socially sustainable goods and services, which are produced and consumed within the framework of the current technological paradigm. Environmental problems are solved through "green" innovation and improvement of products and production processes (McMeekin and Southerton, 2012).

Change—means relative decrease in the influence of consumption due to a shift to other means of consumption, e.g., switching to a less burdensome category of goods and services, instead of driving a car, using public transportation, or instead of eating meat, eating plant proteins. Another example is switching to different business models, such as from buying, owning and using a private car to accessing a shared car, car pool or car rental service.

Reduce—means absolute reduction in the volume of consumption of goods and services leading to an absolute reduction in the consumption of resources and thus an absolute reduction in environmental and social impact. Reduced consumption can be, for example, when individuals reduce food waste, change their fashion habits, fly less, refrain from cars, and live in smaller homes.

Sustainable consumption patterns and levels can probably be achieved only with a combination of these three perspectives, where (1) we consume increasingly efficient products and services (improve), (2) we find more innovative and diverse ways to satisfy our needs and wants

(change), and (3) we refrain from certain consumption (reduce) (Akenji et al., 2021).

In the following we will review the state of academic discussion regarding all three strategies.

Improve—Better consumption

Better consumption is about the consumption of more environmentally efficient or socially sustainable goods and services, which are produced and consumed within the framework of the prevailing technological paradigm. Environmental problems are solved through "green" innovation and improvement of products and production processes (McMeekin and Southerton, 2012). To stimulate the consumption of these eco-efficient products, consumers must make green purchasing decisions. This can be achieved with the help of information, eco-labeling, nudging, and consumer campaigns. Many of the research disciplines that contribute to the discourse of effective sustainable consumption—behavioral sciences, psychology and social psychology, marketing, behavioral economics, economics, and political sciences—often see the individual as the main culprit behind unsustainable consumption, as well as the main agent of change (Devinney et al., 2010; Mont et al., 2013). Politicians and other actors, including companies and academics, are seen as agents who are there to help individuals to change behavior (Devinney et al., 2010).

Example 1: Green markets and consumers

To better understand the individual's role in green consumption, research has focused on studying demographic parameters such as gender and income, which have a major impact on consumption patterns and sustainability impact. A recent study of spending by single men and women showed that men's purchases created 16% higher emissions even though the subjects in the study spent similar sums of money (Carlsson Kanyama et al., 2021). This is because men spend 70% more on categories with high emissions, such as petrol, while women spend more on consumer categories that have a less environmental impact, such as health care, clothing, and furniture. This is in line with the results of previous studies which show that women live in a more sustainable way than men (Bradley, 2009), and place more value on efficient energy use, waste sorting and recycling than men (Konsumentverket, 2020).

Income has proven to be an important indicator of household consumption-related environmental impact (Hubacek et al., 2017). A study from Israel shows how the consumption patterns of poor and rich individuals differ (Peleg-Mizrachi and Tal, 2020): poorer Israelis have a larger ecological footprint per capita in their purchases of textiles and food consumption, while richer Israelis have a relatively larger ecological footprint in transport and housing. Globally, the richest 10% in the world accounted for 49% of emissions in 2015, while the 50% with the lowest income accounted for 7%. Emissions increased between 1990 and 2015, and this increase was overwhelming among the part of the world's highest-income population (Kartha et al., 2020). Therefore, a general approach to how to bring about behavior change is misguided, since the responsibility for the majority of emissions is so strongly concentrated in the hands of a few powerful individuals, referred to by Kenner (2019) as the "polluting elite." These top consumers use their significant economic and political influence to maintain the unsustainable and unfair system that underpins our economy (Wiedmann et al., 2020).

With regard to instruments for sustainable consumption, research points to the importance of developing instruments that are adapted to specific groups of people (Akenji et al., 2021; Newell et al., 2021b). An important issue for future research is the acceptance of various instruments. The Eurobarometer shows that more than half (51%) of Swedish consumers believe that technical solutions are more effective in tackling environmental problems, 40% believe that changing ways of consuming is more effective, followed by 33% who believe in stronger economic incentives to protect the environment (EC, 2020). An important question to ask in future research is whether individuals will support measures to reduce consumption. Research needs to understand why we consume as we do, but there is also a need for more research on what can make us refrain from consuming more (Lorek and Fuchs, 2019).

Example 2: Communication and advertising

Various branches of marketing have emerged that aim to promote green or sustainable consumption (see for example Belz and Peattie, 2012; Guyader et al., 2020). Overall, research on sustainability marketing focuses on integrating sustainability into marketing, but is less likely to delve into consumers' lifestyles or behavioral changes (Kemper and Ballantine, 2019). There are still few studies in marketing that acknowledge that the consumption patterns that conventional marketing encourages are an important driving force for negative environmental impact (Peattie and Peattie, 2009). According to Izagirre-Olaizola (2021), green marketing is also a tool for selling only certain types of eco-labeled products, rather than a tool for tackling the root of the environmental problem—consumption dependency. Criticism of marketing has therefore increased and researchers have begun to ask critical questions about the role of marketing in a society characterized by environmental degradation (Brownlie and Tadajewski, 2008; Firat and Tadajewski, 2010; Nair and Little, 2016). Yet there is more research, at least in traditional academic journals, on marketing that studies how to promote consumerism, than those that focus on marketing restrictions, and how consumerism can be curbed (McDonagh and Prothero, 2014). This can

be explained by the fact that there are powerful actors who benefit from current levels of mass consumption and various attempts to change consumption patterns may end up in open conflict with their interests (Fischer et al., 2021). But there are proposals to, for example, introduce a tax on advertising or ban the advertising of unsustainable goods, for example by banning phrases that give the impression that a product's impact on the environment is minimal, and requirements that advertising must contain information on how to take care of and repair a product, or a requirement that certain environmental information must be included in all advertising, e.g., what energy consumption a product has (Dalhammar et al., 2021b).

Example 3: Choice editing and nudging

There is a growing volume of "marketing noise" from companies and brands, making it difficult for consumers to choose the right brand and product (Owen et al., 2007). This, combined with consumers' limited opportunities to control the messages, has led to an increased interest in research on "greenwashing." Greenwashing is about the practice of presenting false or exaggerated sustainability claims (Guyader et al., 2020) or using environmental messages to divert attention from less desirable behaviors (Pezzullo and Cox, 2018). A recent EU-wide review of sustainability claims online, from various business sectors such as clothing, cosmetics and household equipment, shows that in 42% of cases they were exaggerated, false or misleading, and potentially some of them could be classified as unfair business practices (European Commission, 2021). Despite some countries having started to introduce legislation to counteract this problem, unfounded sustainability claims still represent a problem in marketing (Dalhammar, 2020).

Nudging is one of the instruments proposed to reach consumers who need help in making consumption choices but do not have the time or interest to inform themselves (Ahlner and Carlsson, 2015). Nudging is most effective if the individual agrees that the encouraged behavior is desirable, and gives a better effect in terms of reducing bad behavior if the individual already wants to change the behavior (Thaler and Sunstein, 2008). This shows the importance of combining nudging with other measures such as information/education, to build the foundation for nudging to work and be accepted. To increase the usefulness of nudging, research on evaluation methods is needed to measure its effect because it is a very context-dependent tool (Gravert and Carlsson, 2019).

Overall shortcomings of tools for better consumption

"Better consumption" falls within the framework of the existing economic system as it does not question economic growth but focuses on making it less burdensome in terms of environmental and social impact. More efficient consumption is seen as a way to reduce environmental and social impact, but the potential of the strategy to achieve environmental sustainability is considered limited to address the urgency and scale of the environmental problems humanity is facing (Newell et al., 2021b). This potential becomes even smaller due to rebound effects at the individual- (Hertwich, 2002) and societal level (Herring and Sorell, 2009). Rebound effects in relation to "better consumption" mean that increased efficiency of products can lead to (i) increased use of greener products when they become more efficient and cheaper or (ii) an increase in consumption of other goods, which can be bought from savings from efficiency gains (see Walzberg et al., 2020). An example of a rebound effect concerns light bulbs. When they are replaced by more energy-efficient LED lamps, both the purchases and the use of LED lamps increase, which leads to increased total energy consumption for lighting. Another example is when increased efficiency leads to price reductions or other reduced costs, which helps the consumer save money which is then spent on more environmentally damaging activities, such as air or car travel. Both types of rebound effects can lead to an absolute increase in resource use and emissions instead of a decrease. A recent meta-study shows that a majority of the empirical studies estimate that the rebound effects on the economy as a whole are at least 50% or more (Brockway et al., 2021). This means that half of the potential energy savings from improved energy efficiency are "eaten up" due to various economic and behavioral consequences.

Instruments for "better consumption" have been criticized for limited efficiency and a partial explanation may be the narrow view of human behavior with a focus on either rational argument, such as economic gains, or subjective emotions, such as pleasure. In order to achieve sustainable consumption patterns, and especially levels, changes in society's social, institutional and structural system changes must take place (Jackson, 2009). It is therefore important to better understand the dynamics of various societal and economic systems in relation to consumption and its impact on sustainability.

Change—Consumption shift

The "change" perspective argues for transitions in different socio-technical systems, such as supply systems in different sectors, in business models and changes in social practices. Consumption shifts focus on the meso-level, where different systems and their components are studied. Several theories such as MLP (multi-level perspective) and social practice theory have a common focus on heterogeneous configurations of system components. "Changed" consumption is based on a number of different disciplines, primarily human geography, management, science and technology studies, and sociology. Proponents of this perspective argue that the "better consumption" perspective

has failed to appreciate the integrated role that social and structural contexts play in shaping and limiting behaviors (Van Vliet et al., 2005; Spaargaren et al., 2006; Shove and Walker, 2010) According to Geels et al. (2015) the strategy has greater sustainability potential than the strategy "better consumption."

Example 1: Social practices

Social practice theory was developed to analyze everyday practices in the socio-technical environment (Røpke, 2009). The theory provides an opportunity to go beyond the in Sociology otherwise dominant "dualism" of structure *versus* agency, (see for example Giddens, 1984). Social practice theory can also be fruitful in studies of consumption in relation to environmental and sustainability aspects (Røpke, 2009). Social practice theories emphasize aspects of consumption that tend to be overlooked in traditional theories of consumption. For example, the focus is on the practice of doing rather than having in relation to consumption (Shove et al., 2007). The idea of the rational and responsible consumers that propagate the neoclassical economic model is challenged in social practice theory by the concept of "distributed agency in social practices" (Sahakian and Wilhite, 2014). This means that in order to understand consumption, different selection processes must be studied that are affected by the cognitive processes and physical (body-related) conditions, as well as the material context, the social dimensions that contribute to social learning. By analyzing the links between routine everyday behavior and the greater socio-technical development (Giddens, 1984; Schatzki et al., 2001), opportunities to reduce consumption-related impact can potentially be identified (Warde et al., 2002; Sahakian and Wilhite, 2014).

Social practice theory has been used to study socio-technical systems and consumer behavior in several areas, such as energy (Gram-Hanssen, 2011; Jalas et al., 2017; Jensen, 2017), hygien (Shove, 2003; Gram-Hanssen, 2007), transport (Hesselgren et al., 2020; Sopjani et al., 2020; Svennevik et al., 2020), and food (Leray et al., 2016; Plessz et al., 2016). Theoretically, they have bridged various aspects of socio-technical transitions (Watson, 2012; Chilvers et al., 2018), while other studies looked at how interconnected practitioners play into socio-technical change (Shove et al., 2012; Rosenbloom, 2017; Boamah and Rothfuß, 2018; Greene, 2018) and how technologies are embedded in practitioners (Sahakian and Wilhite, 2014; Järvensivu, 2017). Social practice theories were applied in research on the development and stability of social practices (Hargreaves et al., 2013; Southerton, 2013), as well as on how practices are intertwined in different contexts of consumption (Powells et al., 2014; Vlasova and Gram-Hanssen, 2014; Fonte and Quieti, 2018).

A proposal from social practice theory for decision-makers is to expand the range of processes to "scale up" sustainable consumption behaviors. By first identifying practices that are already changing, and by introducing instruments to strengthen them, the upscaling effect can be achieved by bridging different communities of practice and sharing learning opportunities across different contexts. Spaargaren (2011) suggests that social practice theory can strengthen the governance of sustainable consumption in three ways: by specifying roles and assigning responsibilities to people in addition to traditional shopping practices, by recognizing the role of objects, technologies and infrastructures in transitions to a more sustainable economy, and by enriching the cultural framework of sustainability by studying common practices for sustainable consumption.

Example 2: Business models

In societies characterized by consumer culture, new business models have emerged that are based on ideas of circularity (Geissdoerfer et al., 2017; Mont et al., 2019; Henry et al., 2020; Schwanholz and Leipold, 2020). Research on these business models is diverse and covers issues of innovation, acceptance, user participation, business model configurations, and sustainability assessments. In these business models, the role of citizens/consumers changes from being a buyer to becoming, among other things, a supplier, manager, lender, repairer, or asset manager (Maitre-Ekern and Dalhammar, 2019). In addition to studying consumer acceptance of these business models, they have been studied using social practice theory (Huber, 2017; Philip et al., 2019). Research on business model configurations has advanced toward studying the development of the business models' ecologies, where different actors interact and contribute to a process of social change beyond the business models themselves (Boons and Bocken, 2018). Transition theory has been applied in studies of sustainable business models (Guo et al., 2019; Lee et al., 2020) to understand their evolution and upscaling. Companies that use such business methods face several obstacles arising from the current socio-economic conditions. Therefore, they often need the support of political interventions to be able to compete with established companies with traditional business models (Dalhammar et al., 2021a,b; Milios, 2021).

Research is underway to quantify environmental benefits that may arise from the sharing of unused goods through increased use intensity, transition from selling products to selling services, and potential reduction in the need to manufacture new goods and extract resources (Laukkanen and Tura, 2020). For example, Johnson and Plepys (2021) compared clothing rental with a linear business model and shows that the environmental savings potential of renting and reusing clothes depends on consumer behavior, i.e., how many times consumers wear the clothes, if they use rental to replace their purchasing or on top of it, and how consumers travel to rental stores. Martin et al. (2019) analyzed peer-to-peer sharing in a neighborhood compared to owning household items. They showed that there is significant potential for sharing services

to reduce environmental impact. Research on user experiences suggests that both positive and negative social effects can arise in the sharing economy, such as social cohesion *versus* gentrification; inclusion vs. discrimination; flexible employment *versus* exploitation (Curtis et al., 2020). It is then important to develop tools to be able to map and measure these social aspects. For the sharing economy to function in a sustainable way, new institutional forms and rules must be established to ensure environmental benefits and a positive social impact (Bradley, 2017).

Most of the research on new business models is conducted in the global north (Retamal, 2017). But there is also a need to understand the potential of new business models in the developing world and how they can be promoted and supported (Yuana et al., 2019). In the global north, research is needed on how the gap between design and implementation can be bridged to ensure that new business models result in reduced sustainability impact (Curtis, 2021). There is also a need to understand the type of governance needed, nationally and locally, to ensure socio-economic and environmental sustainability for new business models (Enochsson et al., 2021). Finally, there is also a lack of knowledge about the mechanisms for integrating and scaling up business models (Meijer et al., 2019).

Example 3: Socio-technical systems

Infrastructure is a system, which consists of both technical and institutional components (Solér et al., 2020). Terms such as "path dependency" and "technology lock-in" are used to illustrate how social and technological systems develop over time in interaction and how previous decisions "lock" development into a certain path (Seyfang et al., 2010). Previous studies of socio-technical arrangements often focused on electricity and transport, but since then the studies have also examined other societal domains such as food, heat and buildings, water, cities and waste management (Köhler et al., 2019). Consumption-related research analyzes the material and institutional dimensions of infrastructure, which to a large extent shape consumer behavior, but over which consumers have very little control and influence (see for example Chappells et al., 2000; Hult and Bradley, 2017; Solér et al., 2020). Researchers warn that both the magnitude and extent of the negative effects from different supply systems are likely to intensify in the coming decades (Chappells et al., 2000; Van Vliet et al., 2005; Hult and Bradley, 2017)According to Cohen (2019), many modern supply systems—food supply chains, energy sources and transmission lines, urban planning and mobility services—operate suboptimally; they often exacerbate environmental impact and reinforce inequalities. This makes adjustments in the supply systems increasingly important (Solér et al., 2020).

The opportunities for individuals to avoid certain infrastructure are very limited and instead, it is political decision-makers, urban planners and private actors who have power over the types of infrastructure that become available to people, and consequently which mobility or housing alternatives are to be "consumed." Here, the public sector has an important role to play in promoting more sustainable supply systems and infrastructure. Public consumption and investments in infrastructure such as buildings and roads are responsible for 40% of all Swedish emissions (Naturvårdsverket, 2022). The public sector creates conditions through spatial planning and public procurement, especially procurement in sectors where the public sector has a large market share (healthcare, construction, public transport and vehicles, etc.,). However, changing the market through **public procurement** is not easy, and takes time (Dalhammar and Leire, 2017). The results of a new study show that many municipalities today work actively to promote sustainable consumption in a number of different consumption areas such as energy, waste management, food, and transport (André et al., 2021), but they call for support from the national level in terms of resources and knowledge of public procurement, methods for monitoring the environmental impact of their procurement, and resources for implementing measures. The public sector has also started to work more innovatively; for example, pilot projects are currently underway for procurement for a circular economy (Göthe et al., 2021).

According to some researchers, future research in socio-technical transitions should more explicitly focus on studying supply systems and urban infrastructures, as well as challenges in transforming them (Köhler et al., 2019). There is a need for studies that explore intersections between different supply systems, such as between transport and digital infrastructure, or electricity supply and housing, and how interactions and synergies between different sectors can be used to promote change. Important questions are how existing supply systems and infrastructure are maintained, reproduced and changed and what potential they have to shape the everyday lives of city dwellers in a more sustainable direction.

Overall shortcomings of tools for changing consumption

Just like "better consumption," "changing consumption" falls within the framework of the existing economic system, but certain types of business models may question the prevailing "linear" flows in the economy. The shift in consumption sees change in socio-technical systems as well as social practices and business model ecologies as critical for the transition to sustainability. But there are critical perspectives (Geels et al., 2015). Critics say that an improved socio-technical system is an important step toward a sustainable society, but changes in system configuration will hardly be able to deliver sustainability gains at the required speed (Grubler et al., 2016; Kern and Rogge, 2016; Smil, 2016). Critics are also concerned that the focus of social practice theory and research in "transition

management" is primarily on understanding processes rather than contributing to changes in various societal systems to promote sustainable development. In the area of business models, a more design-oriented perspective is applied with the intention of providing insights into how business models and ecologies for business models can be transformed in a more sustainable direction (Konietzko et al., 2020; Snihur and Bocken, in press). Both circular and sharing business models have the potential to make more sustainable categories of goods and services available, such as reused, repaired and reconditioned goods (Almén et al., 2021; Dalhammar et al., 2021b), and offer new ways of consuming beyond ownership such as sharing, leasing and lending, thereby promoting consumption shifts (Enochsson et al., 2021; Johnson and Plepys, 2021). These business models can potentially lead to reduced environmental impact from consumption if and when they replace the purchase and consumption of newly manufactured goods (Johnson and Plepys, 2021). Studies of electric bicycles show that consumers tend not to replace unsustainable product alternatives, such as privately owned cars, but use both alternatives (Simsekoglu and Klöckner, 2019), which has negative environmental consequences. Theoretically, closed resource flows can reduce the need for extraction of virgin resources and new production, but at present, the contribution from closed flows to our total resource flows is very limited, partly due to rebound effects (see for example Amatuni et al., 2020; Ottelin et al., 2020).

Changing business models, understanding social practices, and even **niche-level experiments** with subsequent upscaling and proliferation, are likely to go too slowly to prevent further deterioration of the planet (Newell et al., 2021b). All of these processes are accompanied by necessary—but slow—processes of learning, interactive engagement, knowledge co-production, and networking. They need to be accelerated and scaled up, but we have a lack of understanding of how this can be done in detail. This may be because these systems, whether at the individual-practitioner level, organizational level (business models), or sectoral level (socio-technical systems), are embedded in and dependent on the established economic, infrastructural and institutional order. It may also be the case that the "agency" for major societal transformations and learning rests elsewhere. Geels et al. (2015) call for "a high level of societal urgency, access to feasible solutions, a support coalition for significant change and inspiring visions" as prerequisites for advocates of change at the socio-technical system level to accept the crucial government measures or value changes needed to have time to slow down and turn around unsustainable paths for our societal development.

Reduce—Sufficient consumption

Advocates of strong sustainability realize the limitations of the previous two perspectives—to streamline products and change consumers' purchasing behavior, as well as to change supply systems and social practices. They advocate transformative conversion processes toward sustainable consumption at a macroeconomic level and with perspectives that are also "beyond the market," and advocate a shift toward new value systems based on principles of adequacy and justice (Costanza, 2006). Proponents of strong sustainability see the need to achieve an absolute reduction in the overall levels of resource consumption and associated environmental impact (Jackson, 2009). Strong sustainability challenges the dominant way of producing, consuming and living by advocating lower consumption volumes for current generations. A small but growing stream of research models alternative ways of organizing our economy that could sustain society's (basic) structures for slower economic growth (Viktor, 2008) or reduced consumption levels while meeting important quality of life criteria (Druckman and Jackson, 2010).

Achieving absolute reduction inevitably requires a discussion of what constitutes the good life, prosperity and human progress, and how to ensure justice within and between generations (D'Alisa et al., 2015). The notions of strong sustainability and de-growth, (see Kallis et al., 2020) are emotionally charged, as many actors associate them with images of lost wealth and freedom of choice, stagnation, reduced access to welfare and a reduced level of well being (Van den Bergh, 2011; Mont et al., 2013). At the same time, there is a stream of academic research that questions the simple links between economic growth and happiness (Easterlin, 1974, 2015; Bok, 2010; Max-Neef, 2010) even though it continues to be a topic of debate (Stevenson and Wolfers, 2008; Easterlin and Angelescu, 2009). Modeling also shows that low growth can be combined with high welfare (Victor, 2010; Jackson and Victor, 2020).

Discussions about growth and sufficiency are often intertwined as it is difficult to see how existing and future populations can be accommodated on a planet with limited resources without a certain degree of sufficiency. We still choose to draw a line between these two concepts and discuss (i) de-growth from a macroeconomic perspective based on scenario and modeling studies, and (ii) sufficiency from an individual and collective perspective that is closely linked to discussions about sustainable lifestyles.

Example 1: Degrowth and the new economic order

In response to the growing concern linked to the role of economic growth in climate change, a growing body of researchers is working to identify potential solutions to the "growth problem" (Wiedmann et al., 2020). Wiedmann et al. (2020) divide research in the field into two groups: one reformist and one more radical. The reformist group consists of heterogeneous approaches such as de-growth (Van den Bergh, 2011), prosperity without growth (Jackson, 2009), and

"steady-state economy" (Daly, 2014). They all aim to achieve the adjustment required within the current institutions, such as market economies and centralized democracies (Alexander and Rutherford, 2014). This means that—in order to become independent of GDP growth—reforms are required by many social systems and institutions such as labor markets, the welfare state, healthcare, and pensions. Grassroots organizations have an important role to play in the transition because they must promote value and cultural changes that lead to sufficiency (Alexander, 2015). However, in order to achieve the necessary diversion of consumption and production, significant policy changes are also proposed such as "progressive environmental taxes or cap and trade systems, targeted investment in green industries and public institutions, wealth redistribution through taxation and maximum income," a guaranteed basic income and/or reduced working hours' (Wiedmann et al., 2020, p. 5).

When it comes to sustainability, Hickel and Kallis (2020) believe that the lower the growth, the greater the chance that it is green, as the chance of decoupling is higher if the growth rate in the economy is lower. There are two types of decoupling: relative and absolute decoupling. Relative decoupling means that resource use and GHG emissions increase, but that they increase at a slower rate than GDP growth. Absolute decoupling means that GDP growth increases without the use of resources and GHG emissions increasing. UNEP has been clear that absolute decoupling is a must (UNEP, 2011, p. 15), but evidence is growing that absolute decoupling does not take place from a consumption-based perspective (Parrique et al., 2019; Haberl et al., 2020; Wiedmann et al., 2020). Many researchers conclude that absolute decoupling appears unrealistic if one looks at developments so far. They therefore advocate that decoupling strategies be complemented by "sufficiency" strategies and absolute targets for resource extraction (Haberl et al., 2020; Wiedenhofer et al., 2020). A study that analyzed technical measures and behavioral strategies to reduce emissions from aviation, cars, public transport, food, heating and investments in buildings, and transport infrastructure, which together account for 63% of total consumption-based emissions, came to the same conclusion (Larsson et al., 2021). Only scenarios where technology development is combined with behavioral changes are in line with the goals in the Paris Agreement (Larsson et al., 2021). Another study by Millward-Hopkins et al. (2020) found that global energy consumption in 2,050 could be reduced to 1960s levels even if the population were to triple. This would require a massive expansion of advanced technology in all sectors and a radical reduction in consumption to adequate levels regardless of income.

Discourses about de-growth and sufficiency are lacking in current environmental policy, but are considered absolutely necessary by many prominent researchers given how urgent it is to implement the transformative transition to 2030–2050 (Wiedmann et al., 2020). But we can note that the reduction of consumption is now beginning to be discussed in official documents and reports, among others in the Nordic countries (Fråne et al., 2021), even though it is still considered a radical proposal. Research is needed to specify what measures are needed to address overconsumption and endless economic growth (Creutzig et al., 2018).

Example 2: Sufficiency and sustainable lifestyles

Sufficient consumption means a reduction in the absolute levels of resource consumption that leads to a reduction in our impact on the planet. Human needs can be met with the help of less material-intensive goods and services and with fewer goods than what we consume today (Spangenberg and Lorek, 2019). In order to maintain prosperity, a restructuring must take place not only of consumption patterns in individuals and households, but also in the restructuring of societies, i.e., technical systems, infrastructure and institutions, as well as norms. Sufficiency cannot become a new norm in a society built on the principles of consumerism and materialism. Since income is the most important reason for high consumption levels, reduced working hours can potentially lead to lower income levels and result in reduced sustainability impact (Persson et al., 2022). Changes in norms can facilitate the transition to more frugal lifestyles if it becomes more accepted to be satisfied with less material goods than is normally considered today, as well as with goods that are second-hand or repaired (Spangenberg and Lorek, 2019). Standards for using intangible social and collective goods can also facilitate the reconstruction of the good life with much less impact on sustainability.

An important branch of sufficiency research is about how different civil society movements can help promote sufficiency (Persson and Klintman, 2021). Furthermore, sufficient consumption promotes a shift to new values such as adequacy and societal orientation, economy and local grassroots innovation. There is a growing group of people who make different choices beyond consumerism (Alexander, 2013). There are examples of movements linked to simplifying lifestyles or living environmentally conscious lives, such as voluntary simplicity or ecovillages, and collective housing. Other movements and organizations promote ideas about circular economy, collaborative consumption and sharing of resources and establish repair cafes, Library of Things, Leisure Banks and the like. There is renewed interest in self-sufficiency leading to various Community initiatives for energy generation and urban cultivation. New groups and directions emerge as "slow travel movement." Already, some consumers are joining the "DIY movement" to learn and access the necessary equipment to repair and reuse products, from upgrading electrical and electronic equipment to renovating houses to repairing and restoring cars. The transition to doing and fixing things is supported by open platforms and blogs to share knowledge and skills, open innovations and "creative places" online, e.g., Instructibles or Fixperts. More consumers are participating

in various do-it-yourself practices in "repair cafes" or "maker spaces" together with other enthusiasts where they can learn new skills or teach others (Moalem and Mosgaard, 2021). Other individuals begin to actively engage in co-production of resources (Ritzer et al., 2012). For example, they become co-producers of electricity *via* smart grids or growing food in city gardens and can consume them themselves, sell them, or share them with others.

To date, sufficiency targets, defined in terms of reducing consumption levels, have not been set at a strategic or political level. At best, sufficiency is seen as a way of life for a very small group of people under the banner of voluntary simplicity. On the other hand, research on concrete policies for sufficiency is increasing, such as environmental ceilings (Alcott, 2018), reduced working hours (Larsson, 2012), maximum income, and green taxation focused on luxury goods (Mastini and Rijnhout, 2018). Callmer and Bradley (2021) analyze different types of sufficiency, and what can be done at the local level. They advocate, among other things, local carbon budgets as a restriction on consumption, as well as strengthening social relations that are outside the market.

Example 3: Societal transformation and sustainability

Transformation involves a "change in form" and is commonly used to address a broader societal change (Hölscher et al., 2018). An important issue in transformation research is the issue of scalability and speed, i.e., where to intervene in the system, and through what leverage point, to bring about the changes in behavior and systems needed to meet the challenges we face. These issues were discussed by the International and Interdisciplinary Cambridge Sustainability Commission on Scaling Behavior Change (Newell et al., 2021a). The Commission proposed that the complexity of change required necessitates a range of societal, infrastructural and regulatory interventions, both from the top down and at the system level, which must be matched by a "large amount of action by individuals and households" (Akenji et al., 2021). Newell et al. (2021a) suggest a distinction between "superficial" and "deep" upscaling. Superficial scaling is about integrating better practices and systems without disrupting key functions of existing systems and without questioning underlying values or worldviews. Superficial upscaling also includes downscaling that can take place at different levels; for example, by reducing the amount of waste thrown away by a household, or by limiting availability of less durable products in stores or by adjusting supply systems to make them more efficient and thus reduce resource consumption. But basic social values and norms remain undisputed. Superficial scaling is clearly linked to the notion of weak durability. Deep upscaling, on the other hand, is more associated with the idea of a paradigm shift.

Overall shortcomings of tools for reducing consumption

Unlike "better consumption" and "changing consumption," "sufficient consumption" questions the current growth paradigm. This is causing great concern among leading political elites. It also opens up for criticism about the extent of changes that need to take place within the next eight years. Many critics believe that de-growth can never become a reality because no political party can base its party program and message on ideas about de-growth. Geels et al. (2015) have also criticized the concept of de-growth for being too static. They call for research on dynamic processes that can facilitate the transition to sustainable systems. Other critical voices question the nature of developed democracies as potentially unsuitable for dealing with major crises such as the climate crisis (Abadi, 2022).

Processes aimed at societal transformation are considered to be slow. They are often based on social criticism of existing institutions and structures. Boström (2020) suggests that social criticism must also look inwards, i.e., there must be a self-critical, transformative learning process. Transformative learning opens up opportunities to re-evaluate our frames of reference as well as the assumptions and worldviews that we take for granted. When it comes to (over) consumption, today's consumption is so natural for us that many of our decisions become automatic (Jackson, 2005) and then it becomes difficult to make them more aware and then change them. Furthermore, the discourse on adequacy is based on assumptions about active prosumers. However, there are concerns about the extent and level of competence and skills required to actively participate in prosumerism and support the repair community and similar movements (Irwin, 2015). Transition towns and repair communities are examples of how new skills can be created in a participatory, collective, and empowering way. Adaptation design can be of interest here as it is based on the idea that not only knowledge, skills and actions should be developed, but also the stories of adaptation processes (Barr and Pollard, 2017).

Conclusions and future research

Sustainable consumption is a growing research field, with many different perspectives. Much of this research points to the need for policy-makers' leadership to achieve the goals of the Paris Agreement. In particular, policy-makers need to take the lead in guiding the transition to a sustainable future and work to engage various actors and societal stakeholders in the transition to an economy and a society that allows for sustainable consumption to become mainstream. Importantly, efficiency-oriented solutions are not going to be enough to succeed in the transition, requiring active engagement with sufficiency-oriented solutions. We therefore need more research that evaluates the economic, environmental and social consequences

of sufficiency measures, taking into account the potential of voluntary movements such as prosumerism, sharing economy, and voluntary simplicity. So far there is limited research investigating different scenarios for a future society with reduced consumption (e.g., Svenfelt et al., 2019; Larsson et al., 2021). Much more of this type of research will be necessary for policy-makers to make confident decisions in implementing sufficiency-oriented measures. This includes an understanding for how sufficiency can be implemented in different groups within the population, and how a successful policy-mix can look like.

As sufficiency can easily be experienced as a reduction in living standards, it is of crucial importance to understand how different groups in society will react to policy-interventions to support sufficiency-oriented measures, as well as how to increase acceptance for such measures. Importantly, the perceived burden of such measures should be perceived as fairly distributed across society. Governance toward a sustainable future is intimately linked to issues of morality, values and ethics, power, justice and equality. There is therefore a need for research that makes a more comprehensive analysis of winners and losers in a transition to sustainable consumption, as well as what arguments can help convince different groups that the transition is necessary and can benefit their group in the short and long term. Related to this, there is a need for research that identifies the benefits of the necessary adjustment, and how different groups can see this in a more positive light. This encompasses even questions about the importance of growth for our economy and the potential for de-growth. Research funders should be prepared to support even controversial research on these issues, as there is a need for financial support for researchers studying alternatives to our current economic system, potential ways forward, and acceptance of different developmental pathways in people from different social groups. Considering that change appears to be inevitable, very little research is conducted on this. Research must also study how more comprehensive and equitable processes for societal transformation toward sustainability can be initiated, including ecosystems of transformation, as well as mechanisms for scaling up new sustainable practices, business models, supply systems and infrastructure that can be accommodated within planetary boundaries.

Regarding efficiency-oriented policies, it is of crucial importance that research into rebound-effects continues and intensified to answer the all-important question what impact various efficiency-gains have on sustainability goals. In refining our understanding of rebound effects, the focus needs to shift from the implementation of individual policies to the implementation of combinations of actions, in order to increase efficiency by increasing synergies and reducing potential contradictions between policies and unforeseen consequences.

All in all, an important role is handed to policy-makers as they are required to lead efforts to achieve sustainable consumption. It is now important that policy-makers understand their imminent responsibility and act with the necessary urgency.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Author contributions

ML, CD, and OM: conceptualization and writing. CD and OM: methodology and investigation. CD: project administration and funding acquisition. All authors contributed to the article and approved the submitted version.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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References

Abadi, C. (2022). What if democracy and climate mitigation are incompatible? *Foreign Policy*. Available online at: https://foreignpolicy.com/2022/01/07/climate-change-democracy/

Ahlner, E., and Carlsson, A. (2015). Transition to sustainable consumption patterns: Synthesis within the framework of the in-depth evaluation of the environmental objectives 2015. *Naturvårdsverket*. Available online at: http://urn.kb.se/resolve?urn=urn:nbn:se:naturvardsverket:diva-8278

Akenji, L., Bengtsson, M., Toivio, V., Lettenmeier, M., Fawcett, T., Parag, Y., et al. (2021). *1.5-Degree Lifestyles: Towards A Fair Consumption Space for All*. Hot or Cool Institute, 209.

Alcott, B. (2018). "Environmental caps as a solution to rebound effects," in *Sufficiency—Moving Beyond the Gospel of Eco-efficiency,* eds L. Rijnhout, R. Mastini, J. Potocnik, J. Spangenberg, V. Kiss, A. Coote, A. Reichel, S. Lorek, and M. Mathai (Brussels: Friends of the Earth Europe), 48. Available online at: https://www.foeeurope.~org/sufficiency

Alexander, S. (2013). Voluntary simplicity and the social reconstruction of law: degrowth from the grassroots up. *Environ. Values* 22, 287–308. doi: 10.3197/096327113X13581561725356

Alexander, S. (2015). *Sufficiency Economy*. Simplicity Institute: Melbourne, Vic.

Alexander, S., and Rutherford, J. (2014). "The deep green alternative—debating strategies of transition," in *Permaculture Research Institute. Permaculture News (blog).* Available online at: https://www.permaculturenews.org/2014/01/23/deep-green-alternative-debating-strategies-transition/

Alfredsson, E., Bengtsson, M., Brown, H. S., Isenhour, C., Lorek, S., Stevis, D., et al. (2018). Why achieving the Paris agreement requires reduced overall consumption and production. *Sustainabil. Sci. Pract. Policy* 14, 1–5. doi: 10.1080/15487733.2018.1458815

Almén, J., Dalhammar, C., Milios, L., and Richter, J. L. (2021). "Repair in the circular economy: Towards a national swedish strategy," in *20th European Roundtable on Sustainable Consumption and Production* (Verlag der Technischen Universität Graz), 21–41.

Amatuni, L., Ottelin, J., Steubing, B., and Mogollón, J. M. (2020). Does car sharing reduce greenhouse gas emissions? Assessing the modal shift and lifetime shift rebound effects from a life cycle perspective. *J. Clean. Prod.* 266:121869. doi: 10.1016/j.jclepro.2020.121869

André, K., Axelsson, K., Dawkins, E., and Gerger Swartling, Å. (2021). *Drivkrafter för Hållbar Konsumtion på Lokal Nivå: Svenska kommuners Roll och Möjligheter*. Stockholm: Naturvårdsverket. Available online at: http://urn.kb.se/resolve?urn=urn:nbn:se:naturvardsverket:diva-8916

Barr, S., and Pollard, J. (2017). Geographies of transition: narrating environmental activism in an age of climate change and 'Peak Oil.' *Environ. Plann. A Econ. Space* 49, 47–64. doi: 10.1177/0308518X16663205

Belz, F.-M., and Peattie, K. (2012). *Sustainability Marketing: A Global Perspective*. Chichester: Wiley.

Boamah, F., and Rothfuß, E. (2018). From technical innovations towards social practices and socio-technical transition? Re-thinking the transition to decentralised solar PV electrification in Africa. *Energy Res. Soc. Sci.* 42, 1–10. doi: 10.1016/j.erss.2018.02.019

Bok, D. (2010). *The Politics of Happiness: What Government Can Learn from the New Research on Well-Being*. Princeton, NJ; Oxford: Princeton University Press. doi: 10.1515/9781400832194

Boons, F., and Bocken, N. (2018). Towards a sharing economy—innovating ecologies of business models. *Technol. Forecast. Soc. Change* 137, 40–52. doi: 10.1016/j.techfore.2018.06.031

Boström, M. (2020). The social life of mass and excess consumption. *Environ. Sociol.* 6, 268–278. doi: 10.1080/23251042.2020.1755001

Bradley, K. (2009). Just *Environments: Politicising Sustainable Urban Development [PhD Thesis]*. KTH.

Bradley, K. (2017). *Delningsekonomi på användarnas villkor (SOU 2017:26)*. Regeringskansliet.

Brockway, P. E., Sorrell, S., Semieniuk, G., Heun, M. K., and Court, V. (2021). Energy efficiency and economy-wide rebound effects: a review of the evidence and its implications. *Renew. Sustain. Energy Rev.* 141:110781. doi: 10.1016/j.rser.2021.110781

Brownlie, D. T., and Tadajewski, M. (2008). *Critical Marketing: Contemporary Issues in Marketing*. Wiley. doi: 10.4135/9781446261286

Callmer, Å., and Bradley, K. (2021). In search of sufficiency politics: the case of Sweden. *Sustainabil. Sci. Pract. Policy* 17, 196–209. Scopus. doi: 10.1080/15487733.2021.1926684

Carlsson Kanyama, A., Nässén, J., and Benders, R. (2021). Shifting expenditure on food, holidays, and furnishings could lower greenhouse gas emissions by almost 40%. *J. Ind. Ecol.*, 25, 1–15. doi: 10.1111/jiec.13176

Chappells, H., Klintman, M., Lindèn, A.-L., Shove, E., Spaargaren, G., and van Vliet, B. (2000). *Domestic Consumption, Utility Services and the Environment [Final Domus Report]*. Wageningen University, 181.

Chilvers, J., Pallett, H., and Hargreaves, T. (2018). Ecologies of participation in socio-technical change: the case of energy system transitions. *Energy Res. Soc. Sci.* 42, 199–210. doi: 10.1016/j.erss.2018.03.020

Circle Economy and RISE. (2022). *The Circularity Gap Report Sweden, [Report to Re:Source]*, 86.

Cohen, M. J. (2019). Introduction to the special section: Innovative perspectives on systems of sustainable consumption and production. *Sustainabil. Sci. Pract. Policy*, 15, 104–110. doi: 10.1080/15487733.2019.1703331

Costanza, R. (2006). Limits to growth: the 30-year update. *Ecol. Econ.* 59, 397–399. doi: 10.1016/j.ecolecon.2005.10.008

Creutzig, F., Roy, J., Lamb, W. F., Azevedo, I. M. L., Bruine de Bruin, W., Dalkmann, H., et al. (2018). Towards demand-side solutions for mitigating climate change. *Nat. Clim. Chang.* 8, 260–263. doi: 10.1038/s41558-018-0121-1

Curtis, S. K. (2021). *Sharing Economy Business Models. Addressing the Design-Implementation Gap [PhD Thesis]*. Lund University.

Curtis, S. K., Singh, J., Mont, O., and Kessler, A. (2020). Systematic framework to assess social impacts of sharing platforms. *PLoS ONE* 15:e0240373. doi: 10.1371/journal.pone.0240373

Dalhammar, C. (2020). Sustainability, the circular economy and consumer law in Sweden. *J. Eur. Consum. Market Law* 9, 125–128.

Dalhammar, C., and Leire, C. (2017). Långsiktiga effekter av miljöanpassad upphandling. *Konkurrensverkets Rapportserie*. Stockholm: Konkurrensverket.

Dalhammar, C., Milios, L., and Richter, J. L. (2021a). "Ecodesign and the circular economy: conflicting policies in Europe," in *EcoDesign and Sustainability I. Products, Services, and Business Models*, eds Y. Kishita, M. Matsumoto, M. Inoue, and S. Fukushige (Singapore: Springer Nature), 187–198. doi: 10.1007/978-981-15-6779-7_14

Dalhammar, C., Milios, L., and Richter, J. L. (2021b). *Increasing the Lifespan of Products. Policies and Consumer Perspectives*. Swedish Energy Agency (ER 2021:25; p. 152). Available online at: https://energimyndigheten.a-w2m.se/Home.mvc?ResourceId=201400

D'Alisa, G., Demaria, F., and Kallis, G. (2015). *Degrowth: A Vocabulary for a New Era*. New York, NY; London: Routledge. doi: 10.4324/9780203796146

Daly, H. E. (2014). *From Uneconomic Growth to a Steady-State Economy*. Cheltenham, UK; Northampton, MA: Edward Elgar Publishing. doi: 10.4337/9781783479979

Devinney, T. N., Auger, P., and Eckhardt, G. M. (2010). *The Myth of the Ethical Consumer*. Cambridge: Cambridge University Press.

Druckman, A., and Jackson, T. (2010). The bare necessities: how much household carbon do we really need? *Ecol. Econ.* 69, 1794–1804. doi: 10.1016/j.ecolecon.2010.04.018

Easterlin, R. A. (1974). "Does economic growth improve the human lot?," in *Nations and Households in Economic Growth: Essays in Honor of Moses Abramovitz,* eds P. A. David and M. W. Reder (New York, NY: Academic Press). doi: 10.1016/B978-0-12-205050-3.50008-7

Easterlin, R. A. (2015). "Happiness and economic growth—the evidence," in *Global Handbook of Quality of Life: Exploration of Well-Being of Nations and Continents*, eds W. Glatzer, L. Camfield, V. Møller, and M. Rojas, (Springer: Netherlands), 283–299.

Easterlin, R. A., and Angelescu, L. (2009). *Happiness and Growth the World Over: Time Series Evidence on the Happiness-Income Paradox*. Institute for the Study of Labor (Discussion Paper No. 4060; p. 31). doi: 10.2139/ssrn.1369806

EC. (2020). *Attitudes of Europeans Towards the Environment [Eurobarometer survey]*. European Commission. Available online at: https://europa.eu/eurobarometer/surveys/detail/2257

Enochsson, L., Voytenko Palgan, Y., Plepys, A., and Mont, O. (2021). Impacts of the sharing economy on urban sustainability: the perceptions of municipal governments and sharing organisations. *Sustainability* 13:4213. doi: 10.3390/su13084213

European Commission. (2021). *Screening of Websites [Text]*. European Commission. Available online at: https://ec.europa.eu/commission/presscorner/detail/en/ip_21_269

Firat, A. F., and Tadajewski, M. (2010). *Critical Marketing—Marketing in Critical Condition* (London: Sage Publications), 127–150.

Fischer, D., Reinermann, J.-L., Guillen Mandujano, G., DesRoches, C. T., Diddi, S., and Vergragt, P. J. (2021). Sustainable consumption communication: a review of an emerging field of research. *J. Clean. Prod.* 300:126880. doi: 10.1016/j.jclepro.2021.126880

Fonte, M., and Quieti, M. G. (2018). "Food production and consumption practices toward sustainability: the role and vision of civic food networks," in *Encyclopedia of Food Security and Sustainability II*, eds P. Ferranti, E. Berry, and J. Anderson (Amsterdam, Oxford, Cambridge: Elsevier), 17–25. doi: 10.1016/B978-0-08-100596-5.22362-7

Fråne, A., Dahlbom, M., Sanctuary, M., Malmaeus, M., Fjellander, L., and de Jong, A. (2021). *Towards Sustainable Consumption in the Nordic Region*. Nordic

Council of Ministers, 78. Available online at: http://urn.kb.se/resolve?urn=urn:nbn:se:norden:org:diva-12214. doi: 10.6027/nord2021-024

Geels, F. W., McMeekin, A., Mylan, J., and Southerton, D. (2015). A critical appraisal of sustainable consumption and production research: the reformist, revolutionary and reconfiguration positions. *Glob. Environ. Change* 34, 1–12. doi: 10.1016/j.gloenvcha.2015.04.013

Geissdoerfer, M., Savaget, P., Bocken, N. M., and Hultink, E. J. (2017). The circular economy–a new sustainability paradigm? *J. Clean. Prod.* 143, 757–768. doi: 10.1016/j.jclepro.2016.12.048

Giddens, A. (1984). *The Constitution of Society: Outline of a Theory of Structuration*. Cambridge: Polity Press.

Göthe, L., Norin, H., Losman, M., and Ryding, S.-O. (2021). *Cirkulär Upphandling i Praktiken – Demonstration av en Svensk Modell [Rapport till RE:Source]*. Ecoplan och IVL. Available online at: https://www.ivl.se/projektwebbar/klimatanpassad-och-cirkular-upphandling/cirkular-upphandling.html

Gram-Hanssen, K. (2007). Teenage consumption of cleanliness: how to make it sustainable? *Sustainabil. Sci. Pract. Policy* 3, 15–23. doi: 10.1080/15487733.2007.11907998

Gram-Hanssen, K. (2011). Understanding change and continuity in residential energy consumption. *J. Consum. Cult.* 11, 61–78. doi: 10.1177/1469540510391725

Gravert, C., and Carlsson, F. (2019). *Nudge som miljöekonomiskt styrmedel-Att designa och utvärdera*. Naturvårdsverket, Stockholm.

Greene, M. (2018). Socio-technical transitions and dynamics in everyday consumption practice. *Glob. Environ. Change* 52, 1–9. doi: 10.1016/j.gloenvcha.2018.05.007

Grubler, A., Wilson, C., and Nemet, G. (2016). Apples, oranges, and consistent comparisons of the temporal dynamics of energy transitions. *Energy Res. Soc. Sci.* 22, 18–25. doi: 10.1016/j.erss.2016.08.015

Guo, X., Lujan Jaramillo, Y. J., Bloemhof-Ruwaard, J., and Claassen, G. D. H. (2019). On integrating crowdsourced delivery in last-mile logistics: a simulation study to quantify its feasibility. *J. Clean. Prod.* 241:118365. doi: 10.1016/j.jclepro.2019.118365

Guyader, H., Ottosson, M., and Parment, A. (2020). *Marketing and Sustainability: Why and How Sustainability is Changing Current Marketing Practices*. Lund: Studentlitteratur AB.

Haberl, H., Wiedenhofer, D., Virág, D., Kalt, G., Plank, B., Brockway, P., et al. (2020). A systematic review of the evidence on decoupling of GDP, resource use and GHG emissions, part II: synthesizing the insights. *Environ. Res. Lett.* 15:065003. doi: 10.1088/1748-9326/ab842a

Hargreaves, T., Longhurst, N., and Seyfang, G. (2013). Up, down, round and round: connecting regimes and practices in innovation for sustainability. *Environ. Plann. A* 45, 402–420. doi: 10.1068/a45124

Heiskanen, E., Mont, O., and Power, K. (2014). A map is not a territory—making research more helpful for sustainable consumption policy. *J. Consum. Policy* 37, 27–44. doi: 10.1007/s10603-013-9247-8

Henry, M., Bauwens, T., Hekkert, M., and Kirchherr, J. (2020). A typology of circular start-ups: an analysis of 128 circular business models. *J. Clean. Prod.* 245:118528. doi: 10.1016/j.jclepro.2019.118528

Herring, H., and Sorell, S. (2009). *Energy Efficiency and Sustainable Consumption: The Rebound Effect*. Palgrave Macmillan.

Hertwich, E. G. (2002). Consumption and the rebound effect: An industrial ecology perspective. *J. Indust. Ecol.* 9, 85–98. doi: 10.1162/1088198054084635

Hesselgren, M., Sjöman, M., and Pernestål, A. (2020). Understanding user practices in mobility service systems: results from studying large scale corporate MaaS in practice. *Travel Behav. Soc.* 21, 318–327. doi: 10.1016/j.tbs.2018.12.005

Hickel, J., and Kallis, G. (2020). Is green growth possible? *New Polit. Econ.* 25, 469–486. doi: 10.1080/13563467.2019.1598964

Hölscher, K., Wittmayer, J. M., and Loorbach, D. (2018). Transition *versus* transformation: what's the difference? *Environ. Innov. Societal Transit.* 27, 1–3. doi: 10.1016/j.eist.2017.10.007

Hubacek, K., Baiocchi, G., Feng, K., Muñoz Castillo, R., Sun, L., and Xue, J. (2017). Global carbon inequality. *Energy Ecol. Environ.* 2, 361–369. doi: 10.1007/s40974-017-0072-9

Huber, A. (2017). Theorising the dynamics of collaborative consumption practices: a comparison of peer-to-peer accommodation and cohousing. *Environ. Innov. Societal Transit.* 23, 53–69. doi: 10.1016/j.eist.2016.12.001

Hult, A., and Bradley, K. (2017). Planning for sharing–providing infrastructure for citizens to be makers and sharers. *Plann. Theory Pract.* 18, 597–615. doi: 10.1080/14649357.2017.1321776

Irwin, T. (2015). Transition design: a proposal for a new area of design practice, study, and research. *Des. Cult.* 7, 229–246. doi: 10.1080/17547075.2015.1051829

Izagirre-Olaizola, J. (2021). Is green marketing an oxymoron? A holistic viewpoint. *Estonian J. Earth Sci.* 25, 321–338. doi: 10.3176/tr.2021.3.04

Jackson, T. (2005). *Motivating Sustainable Consumption*. Centre for Environmental Strategy, University of Surrey, 170.

Jackson, T. (2009). *Prosperity Without Growth. Economics for a Finite Planet. Earthscan*. London: Routledge. doi: 10.4324/9781849774338

Jackson, T., and Victor, P. A. (2020). The transition to a sustainable prosperity-a stock-flow-consistent ecological macroeconomic model for Canada. *Ecol. Econ.* 177, 106787. doi: 10.1016/j.ecolecon.2020.106787

Jalas, M., Hyysalo, S., Heiskanen, E., Lovio, R., Nissinen, A., Mattinen, M., et al. (2017). Everyday experimentation in energy transition: a practice-theoretical view. *J. Clean. Prod.* 169, 77–84. doi: 10.1016/j.jclepro.2017.03.034

Järvensivu, P. (2017). A post-fossil fuel transition experiment: exploring cultural dimensions from a practice-theoretical perspective. *J. Clean. Prod.* 169, 143–151. doi: 10.1016/j.jclepro.2017.03.154

Jensen, C. L. (2017). Understanding energy efficient lighting as an outcome of dynamics of social practices. *J. Clean. Prod.* 165, 1097–1106. doi: 10.1016/j.jclepro.2017.07.213

Johnson, E., and Plepys, A. (2021). Product-service systems and sustainability: analysing the environmental impacts of rental clothing. *Sustainability* 13:2118. doi: 10.3390/su13042118

Kallis, G. (2019). "Limits: why malthus was wrong and why environmentalists should care," in *Limits*. Stanford: Stanford University Press. doi: 10.1515/9781503611566

Kallis, G., Paulson, S., D'Alisa, G., and Demaria, F. (2020). *The Case for Degrowth*. Hoboken, NJ: John Wiley and Sons.

Kartha, S., Kemp-Benedict, E., Ghosh, E., Nazareth, A., and Gore, T. (2020). *The Carbon Inequality Era: An Assessment of the Global Distribution of Consumption Emissions Among Individuals From 1990 to 2015 and Beyond*. SEI and Oxfam. doi: 10.21201/2020.6492

Kemper, J. A., and Ballantine, P. W. (2019). What do we mean by sustainability marketing? *J. Market. Manage.* 35, 277–309. doi: 10.1080/0267257X.2019.1573845

Kenner, D. (2019). *Carbon Inequality: The Role of the Richest in Climate Change*. London: Routledge. doi: 10.4324/9781351171328

Kern, F., and Rogge, K. S. (2016). The pace of governed energy transitions: agency, international dynamics and the global Paris agreement accelerating decarbonisation processes? *Energy Res. Soc. Sci.* 22, 13–17. doi: 10.1016/j.erss.2016.08.016

Köhler, J., Geels, F. W., Kern, F., Markard, J., Onsongo, E., Wieczorek, A., et al. (2019). An agenda for sustainability transitions research: state of the art and future directions. *Environ. Innov. Societal Transit.* 31, 1–32. doi: 10.1016/j.eist.2019.01.004

Konietzko, J., Bocken, N., and Hultink, E. J. (2020). Circular ecosystem innovation: An initial set of principles. *J. Clean. Prod.* 253:119942. doi: 10.1016/j.jclepro.2019.119942

Konsumentverket. (2020). *Konsumenterna och miljön 2020. Möjligheter att göra val med miljöhänsyn (Rapport 2020:2)*. Konsumentverket. Available online at: https://www.konsumentverket.se/om-konsumentverket/analys-och-omvarldsbevakning/forskning-och-rapporter/konsumenterna-och-miljon/konsumenterna-och-miljon-2020/

Larsson, J. (2012). *Studier i Tidsmässig Välfärd – Med Fokus på Tidsstrategier och Tidspolitik för Småbarnsfamiljer [Doctoral]*. Göteborg Universitet.

Larsson, J., Morfeldt, J., Johansson, D., and Rootzén, J. (2021). *Konsumtionsbaserade Scenarier för Sverige—Underlag för Diskussioner om nya Klimatmål [Mistra Sustainable Consumption, Rapport 1:11.]*. Chalmers tekniska högskola, 71. Available online at: https://www.sustainableconsumption.se/vetenskaplig/

Laukkanen, M., and Tura, N. (2020). The potential of sharing economy business models for sustainable value creation. *J. Clean. Prod.* 253:120004. doi: 10.1016/j.jclepro.2020.120004

Lee, J., Kim, J., Kim, H., and Hwang, J. (2020). Sustainability of ride-hailing services in China's mobility market: a simulation model of socio-technical system transition. *Telemat. Inform.* 53:101435. doi: 10.1016/j.tele.2020.101435

Leray, L., Sahakian, M., and Erkman, S. (2016). Understanding household food metabolism: relating micro-level material flow analysis to consumption practices. *J. Clean. Prod.* 125, 44–55. doi: 10.1016/j.jclepro.2016.03.055

Lorek, S., and Fuchs, D. (2019). "Why only strong sustainable consumption governance will make a difference," in *A Research Agenda for Sustainable*

Consumption Governance, ed O. Mont (Cheltenham, UK; Northampton, MA: Edward Elgar Publishing Ltd).

Maitre-Ekern, E., and Dalhammar, C. (2019). Towards a hierarchy of consumption behaviour in the circular economy. *Maastrich. J. Eur. Comp. Law* 26, 394–420. doi: 10.1177/1023263X19840943

Martin, M., Lazarevic, D., and Gullström, C. (2019). Assessing the environmental potential of collaborative consumption: peer-to-peer product sharing in Hammarby Sjöstad, Sweden. *Sustainability* 11:190. doi: 10.3390/su11010190

Mastini, R., and Rijnhout, L. (2018). "Ideas for sufficiency," in *Sufficiency—Moving Beyond the Gospel of Eco-efficiency,* eds L. Rijnhout and R. Mastini (Brussels: Friends of the Earth Europe), 34–45. Available online at: https://www.foeeurope.~org/sufficiency

Max-Neef, M. (2010). The world on a collision course and the need for a new economy. *Ambio* 39, 200–210. doi: 10.1007/s13280-010-0028-1

McDonagh, P., and Prothero, A. (2014). Sustainability marketing research: past, present and future. *J. Market. Manage.* 30, 1186–1219. doi: 10.1080/0267257X.2014.943263

McMeekin, A., and Southerton, D. (2012). Sustainability transitions and final consumption: practices and socio-technical systems. *Technol. Analy. Strateg. Manage.* 24, 345–361. doi: 10.1080/09537325.2012.663960

Meijer, L. L. J., Schipper, F., and Huijben, J. C. C. M. (2019). Align, adapt or amplify: upscaling strategies for car sharing business models in Sydney, Australia. *Environ. Innov. Societal Transit.* 33, 215–230. doi: 10.1016/j.eist.2019.06.003

Milanovic, B. (2021). "Degrowth: solving the impasse by magical thinking," in *Globalinequality*. Available online at: http://glineq.blogspot.com/2021/02/degrowth-solving-impasse-by-magical.html (accessed February 20, 2021)

Milios, L. (2021). Overarching policy framework for product life extension in a circular economy—a bottom-up business perspective. *Environ. Policy Govern.* 31, 330–346. doi: 10.1002/eet.1927

Millward-Hopkins, J., Steinberger, J. K., Rao, N. D., and Oswald, Y. (2020). Providing decent living with minimum energy: a global scenario. *Glob. Environ. Change* 65:102168. doi: 10.1016/j.gloenvcha.2020.102168

Moalem, R. M., and Mosgaard, M. A. (2021). A critical review of the role of repair cafés in a sustainable circular transition. *Sustainability* 13:12351. doi: 10.3390/su132212351

Mont, O., and Dalhammar, C. (2005). Sustainable consumption: at the crossroad of environmental and consumer policies. *Int. J. Sustain. Dev.* 8, 258–279. doi: 10.1504/IJSD.2005.009575

Mont, O., Heiskanen, E., Power, K., and Kuusi, H. (2013). *Improving Nordic Policymaking by Dispelling Myths on Sustainable Consumption*. Nordic Council of Ministers (Nordisk Ministerråd). Available online at: http://www.diva-portal.org/smash/get/diva2:702825/FULLTEXT01.pdf

Mont, O., Whalen, K., and Nussholz, J. (2019). "Sustainable innovation in business models: celebrated but not interrogated," in *Handbook of Sustainable Innovation,* eds F. Boons and A. McMeekin, (Edward Elgar Publishing). doi: 10.4337/9781788112574.00013

Nair, S. R., and Little, V. J. (2016). Context, culture and green consumption: a new framework. *J. Int. Consum. Market.* 28, 169–184. doi: 10.1080/08961530.2016.1165025

Naturvårdsverket. (2022). *Vad Ingår i de Konsumtionsbaserade Utsläppen?* Available online at: https://www.naturvardsverket.se/amnesomraden/klimatomstallningen/omraden/klimatet-och-konsumtionen/vad-ingar-i-de-konsumtionsbaserade-utslappen/

Newell, P., Daley, F., and Twena, M. (2021a). *Changing Our Ways? Behaviour change; the climate crisis*. The Cambridge Sustainability Commission on Scaling Behaviour Change, 73. Available online at: https://www.cambridge.org/core/journals/global-sustainability/cambridge-sustainability-commissions/changing-our-ways. doi: 10.33774/coe-2021-544jx

Newell, P., Twena, M., and Daley, F. (2021b). Scaling behaviour change for a 1.5-degree world: challenges and opportunities. *Global Sustainabil.* 4, 1–13. doi: 10.1017/sus.2021.23

Ottelin, J., Cetinay, H., and Behrens, P. (2020). Rebound effects may jeopardize the resource savings of circular consumption: evidence from household material footprints. *Environ. Res. Lett.* 15:104044. doi: 10.1088/1748-9326/abaa78

Owen, L., Seaman, H., and Prince, S. (2007). *Public Understanding of Sustainable Consumption of Food [A Report to the Department for Environment, Food and Rural Affairs. Opinion Leader]*. Defra.

Parrique, T., Barth, J., Briens, F., Kerschner, C., Kraus-Polk, A., Kuokkanen, A., et al. (2019). *Decoupling Debunked – Evidence and Arguments Against Green Growth as a Sole Strategy for Sustainability*. EEB—The European Environmental Bureau, 80. Available online at: https://eeb.org/library/decoupling-debunked/

Peattie, K., and Peattie, S. (2009). Social marketing: a pathway to consumption reduction? *J. Bus. Res.* 62, 260–268. doi: 10.1016/j.jbusres.2008.01.033

Peleg-Mizrachi, M., and Tal, A. (2020). Caveats in environmental justice, consumption and ecological footprints: the relationship and policy implications of socioeconomic rank and sustainable consumption patterns. *Sustainability* 12:231. doi: 10.3390/su12010231

Persson, O., and Klintman, M. (2021). Framing sufficiency: strategies of environmental non-governmental organisations towards reduced material consumption. *J. Consum. Cult.* 22, 515–533. doi: 10.1177/14695405219 90857

Persson, O., Larsson, J., and Nässén, J. (2022). Working less by choice: what are the benefits and hardships? *Sustainabil. Sci. Pract. Policy* 18, 81–96. doi: 10.1080/15487733.2021.2023292

Pezzullo, P. C., and Cox, R. (2018). *Environmental Communication and the Public Sphere av Phaedra C Pezzullo (Häftad)*. Thousand Oaks, CA: SAGE Publications. Available online at: https://www.bokus.com/bok/9781506363592/environmental-communication-and-the-public-sphere/

Philip, H. E., Ozanne, L. K., and Ballantine, P. W. (2019). Exploring online peer-to-peer swapping: a social practice theory of online swapping. *J. Market. Theory Pract.* 27, 413–429. doi: 10.1080/10696679.2019.1644955

Plessz, M., Dubuisson-Quellier, S., Gojard, S., and Barrey, S. (2016). How consumption prescriptions affect food practices: assessing the roles of household resources and life-course events. *J. Consum. Cult.* 16, 101–123. doi: 10.1177/1469540514521077

Powells, G., Bulkeley, H., Bell, S., and Judson, E. (2014). Peak electricity demand and the flexibility of everyday life. *Geoforum* 55, 43–52. doi: 10.1016/j.geoforum.2014.04.014

Raworth, K. (2012). *A Safe and Just Space for Humanity: Can We Live Within the Doughnut? [Oxfam Discussion Papers]*. Oxfam, 26.

Raworth, K. (2017). *Doughnut Economics: Seven Ways to Think Like a 21st-Century Economist*. Chelsea: Chelsea Green Publishing.

Retamal, M. (2017). Product-service systems in Southeast Asia: Business practices and factors influencing environmental sustainability. *J. Clean. Prod.* 143, 894–903. doi: 10.1016/j.jclepro.2016.12.032

Ritzer, G., Dean, P., and Jurgenson, N. (2012). The coming age of the prosumer. *Am. Behav. Scient.* 56, 379–398. doi: 10.1177/0002764211429368

Rockström, J., Steffen, W., Noone, K., Persson, Å., Chapin, F. S., Lambin, E. F., et al. (2009). Planetary boundaries: exploring the safe operating space for humanity. *Ecol. Soc.* 14:32. doi: 10.5751/ES-03180-140232

Røpke, I. (2009). Theories of practice—new inspiration for ecological economic studies on consumption. *Ecol. Econ.* 68, 2490–2497. doi: 10.1016/j.ecolecon.2009.05.015

Rosenbloom, D. (2017). Pathways: an emerging concept for the theory and governance of low-carbon transitions. *Glob. Environ. Change*, 43, 37–50. doi: 10.1016/j.gloenvcha.2016.12.011

Sahakian, M., and Wilhite, H. (2014). Making practice theory practicable: towards more sustainable forms of consumption. *J. Consum. Cult.* 14, 25–44. doi: 10.1177/1469540513505607

Scharin, H. (2018). *Samhällsekonomiska Analysers Roll i Miljömålsarbetet*. Anthesis (Rapport 2018:12; p. 88).

Schatzki, T. R., Knorr-Cetina, K., and von Savigny, E. (2001). *The Practice Turn in Contemporary Theory*. London: Routledge.

Schwanholz, J., and Leipold, S. (2020). Sharing for a circular economy? An analysis of digital sharing platforms' principles and business models. *J. Clean. Prod.* 269:122327. doi: 10.1016/j.jclepro.2020.122327

Seyfang, G., Haxeltine, A., Hargreaves, T., and Longhurst, N. (2010). *Energy and Communities in Transition: Towards a New Research Agenda on Agency and Civil Society in Sustainability Transitions.* CSERGE working paper EDM.

Shove, E. (2003). Converging conventions of comfort, cleanliness and convenience. *J. Consum. Policy* 26, 395–418. doi: 10.1023/A:1026362829781

Shove, E., Pantzar, M., and Watson, M. (2012). *The Dynamics of Social Practice: Everyday life and How it Changes*. London: Sage. doi: 10.4135/9781446250655

Shove, E., and Walker, G. (2010). Governing transitions in the sustainability of everyday life. *Res. Policy* 39, 471–471. doi: 10.1016/j.respol.2010.01.019

Shove, E., Watson, M., Hand, M., and Ingram, J. (2007). *The Design of Everyday Life*. Oxford; New York, NY: Berg. doi: 10.5040/9781474293679

Simsekoglu, Ö., and Klöckner, C. A. (2019). The role of psychological and socio-demographical factors for electric bike use in Norway. *Int. J. Sustain. Transport.* 13, 315–323. doi: 10.1080/15568318.2018.1466221

Smil, V. (2016). Examining energy transitions: a dozen insights based on performance. *Energy Res. Soc. Sci.* 22, 194–197. doi: 10.1016/j.erss.2016.08.017

Snihur, Y., and Bocken, N. (in press). A call for action: The impact of business model innovation on business ecosystems, society and planet. *Long Range Plann.* 102182. doi: 10.1016/j.lrp.2022.102182

Solér, C., Koroschetz, B., and Salminen, E. (2020). An infrastructural perspective on sustainable consumption—activating and obligating sustainable consumption through infrastructures. *J. Clean. Prod.* 243, 118601. doi: 10.1016/j.jclepro.2019.118601

Sopjani, L., Stier, J. J., Hesselgren, M., and Ritzén, S. (2020). Shared mobility services *versus* private car: implications of changes in everyday life. *J. Clean. Prod.* 259, 120845. doi: 10.1016/j.jclepro.2020.120845

Southerton, D. (2013). Habits, routines and temporalities of consumption: from individual behaviours to the reproduction of everyday practices. *Time Soc.* 22, 335–355. doi: 10.1177/0961463X12464228

Spaargaren, G. (2011). Theories of practices: agency, technology, and culture: exploring the relevance of practice theories for the governance of sustainable consumption practices in the new world-order. *Glob. Environ. Change* 21, 813–822. doi: 10.1016/j.gloenvcha.2011.03.010

Spaargaren, G., Martens, S., and Beckers, T. A. M. (2006). "Sustainable technologies and everyday life," in *User Behaviour and Technology Development*, eds P.-P. Verbeek and A. Slob (Dordrecht: Springer) 107–118. doi: 10.1007/978-1-4020-5196-8_11

Spangenberg, J. H., and Lorek, S. (2019). Sufficiency and consumer behaviour: from theory to policy. *Energy Policy* 129, 1070–1079. doi: 10.1016/j.enpol.2019.03.013

Steffen, W., Broadgate, W., Deutsch, L., Gaffney, O., and Ludwig, C. (2015). The trajectory of the Anthropocene: the great acceleration. *Anthropocene Rev.* 2, 81–98. doi: 10.1177/2053019614564785

Stevenson, B., and Wolfers, J. (2008). Economic growth and subjective well-being: reassessing the Easterlin paradox. *Natl. Bur. Econ. Res.* 1–87. doi: 10.3386/w14282

Svenfelt, Å., Alfredsson, E. C., Bradley, K., Fauré, E., Finnveden, G., Fuehrer, P., et al. (2019). Scenarios for sustainable futures beyond GDP growth 2050. *Futures* 111, 1–14. doi: 10.1016/j.futures.2019.05.001

Svennevik, E. M. C., Julsrud, T. E., and Farstad, E. (2020). From novelty to normality: reproducing car-sharing practices in transitions to sustainable mobility. *Sustainabil. Sci. Pract. Policy* 16, 169–183. doi: 10.1080/15487733.2020.1799624

Thaler, R. H., and Sunstein, C. R. (2008). *Nudge: Improving Decisions about Health, Wealth, and Happiness*. New Haven, CT: Yale University Press.

Torraco, R. J. (2005). Writing integrative literature reviews: guidelines and examples. *Hum. Resour. Dev. Rev.* 4, 356–367. doi: 10.1177/1534484305278283

UN DESA. (2016). *Transforming Our World: The 2030 Agenda for Sustainable Development*. United Nations, p. 41.

UN. (2002). *World Summit on Sustainable Development (WSSD), Johannesburg Summit*. Available online at: https://sustainabledevelopment.un.org/milesstones/wssd

UNCED. (1992). *Agenda 21. The Earth Summit: The United Nations Conference on Environment and Development*.

UNEP. (2001). *Consumption Opportunities. Strategies for Change. A Report for Decision-makers*. UNEP, p. 69.

UNEP. (2011). *Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication.* UNEP, p. 626.

Van den Bergh, J. C. (2011). Environment *versus* growth—a criticism of "degrowth" and a plea for "a-growth." *Ecol. Econ.* 70, 881–890. doi: 10.1016/j.ecolecon.2010.09.035

Van Vliet, B., Chappells, H., and Shove, E. (2005). *Infrastructures of Consumption.* Environmental Innovation in the Utility Industries. Earthscan.

Victor, P. (2010). Questioning economic growth. *Nature* 468, 370–371. doi: 10.1038/468370a

Viktor, P. (2008). *Managing without Growth: Slower by Design, Not Disaster.* Cheltenham, UK; Northampton, MA: Edward Elgar Publishing, Inc.

Vlasova, L., and Gram-Hanssen, K. (2014). Incorporating inhabitants' everyday practices into domestic retrofits. *Build. Res. Inf.* 42, 512–524. doi: 10.1080/09613218.2014.907682

Walzberg, J., Dandres, T., Merveille, N., Cheriet, M., and Samson, R. (2020). Should we fear the rebound effect in smart homes? *Renew. Sustain. Energy Rev.* 125:109798. doi: 10.1016/j.rser.2020.109798

Warde, A., Southerton, D., and Tomlinson, M. (2002), *August. Theories of Practice and Consumption: Prelude to an Investigation of the Diffusion of Consumer Cultures*. ESA Working Group on Consumption.

Watson, M. (2012). How theories of practice can inform transition to a decarbonised transport system. *J. Transp. Geogr.* 24, 488–496. doi: 10.1016/j.jtrangeo.2012.04.002

Wiedenhofer, D., Virág, D., Kalt, G., Plank, B., Streeck, J., Pichler, M., et al. (2020). A systematic review of the evidence on decoupling of GDP, resource use and GHG emissions, part I: bibliometric and conceptual mapping. *Environ. Res. Lett.* 15:063002. doi: 10.1088/1748-9326/ab8429

Wiedmann, T., Lenzen, M., Keyßer, L. T., and Steinberger, J. K. (2020). Scientists' warning on affluence. *Nat. Commun.* 11, 1–10. doi: 10.1038/s41467-020-16941-y

Yuana, S. L., Sengers, F., Boon, W., and Raven, R. (2019). Framing the sharing economy: a media analysis of ridesharing platforms in Indonesia and the Philippines. *J. Clean. Prod.* 212, 1154–1165. doi: 10.1016/j.jclepro.2018.12.073

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Restructuring urban planning to facilitate sustainable consumption

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Food, mobility, and housing are essential and fundamental to human life. At the same time, these consumption areas have the highest climate impact. To achieve a higher degree of climate-friendly consumption, radical changes in everyday practices of food, mobility, and housing are needed. In this paper, empirical data demonstrates that time is perceived as a limited resource in everyday life which drives (un)sustainable practices. Through discussions of the perception of time and related practices, it becomes visible that urban mobility planning connects specific food and housing practices through an understanding of historical and contemporary urban planning supporting time efficiency. This indicates that rethinking urban forms and infrastructure can provide frames that can restructure everyday practices to become more sustainable. To exemplify this, the 15-minute city concept is used as a speculative example of how to restructure everyday practices and facilitate a planning approach that is aligned with sustainable consumption.

KEYWORDS

sustainable consumption, time, urban planning, 15-minute city, everyday practices

Introduction

Currently, societies are striving to reduce CO_2 emissions to prevent severe climate change. This is partly due to resource-intensive consumption practices in high-income societies (Jouzi et al., 2021). A significant proportion of CO_2 emissions comes from consumer activities connected to food, mobility, and housing—fundamental pillars of human life (Fuchs et al., 2021). However, it has proven difficult so far to redirect consumption practices onto more climate-friendly paths. This is despite political agreements and governance[1] as well as research pointing to the importance of a strong focus on these consumption areas (Lorek and Fuchs, 2019). In this paper, we argue that to prevent severe climate change and enhance sustainable consumption, a focus on connected consumption practices of food, mobility, and housing is needed. Practices which take place in the urban mobile everyday life.

Within the field of sustainable consumption and everyday practices, time is seen as an important resource (Heisserer and Rau, 2017; Jouzi et al., 2021). Research indicates that sustainable consumption is often seen as time-consuming, which is a potential

1 See Fuchs and Lorek (2005) and Lorek and Fuchs (2019) for discussions on sustainable consumption governance with notions of "hard" and "soft" sustainability governance.

reason for sustainable practices not being performed (Chai et al., 2015; Jouzi et al., 2021). People simply perceive limited time in their everyday lives (Shove et al., 2009; Arbuthnott and Scerbe, 2017; Smetschka et al., 2019; Jouzi et al., 2021). To encourage sustainable consumption practices, rhythms of everyday life and relationships between practices and temporalities need further investigation (Jouzi et al., 2021).

The perception of a lack of time can be traced back to how modern society is built to enhance efficient mobilities. Mobilities focus on large-scale flows of people, goods, capital, and information, as well as more local processes of daily transportation, communication, and the movement of artifacts (Urry, 2000). The primary focus of planning throughout modernity has been on speed and flows, aiming to facilitate the distribution of artifacts and the modern individual's freedom and flexibility (Freudendal-Pedersen and Kesselring, 2016). Planning for a mobile life and modernity meant planning for effectiveness. Cities were constructed to support specialized areas for working, living, and studying (Manzini, 2022). Urban planning has supported effectiveness and fast paces, which has resulted in spaces with a lack of sensitivity to time (Gwiazdzinski, 2014; Chair Entrepreneurship Territory Innovation, 2020). Thus, mobilities are considered fundamental in (re)structuring modern urban social life (Cresswell, 2006; Sheller and Urry, 2006; Canzler et al., 2008; Urry, 2011; Freudendal-Pedersen, 2022).

In this paper, we argue that speeding up and lack of sensitivity to time in planning promote unsustainable consumption practices. The paper empirically demonstrates how time is perceived as a limited resource in everyday practices. Mobilities often connect food and housing practices, hence, predominantly empirical data related to time perception of mobility is presented. Based on empirical data, it is highlighted how urban form and infrastructure relate to the perception of limited time. Therefore, we argue that time perceptions and urban form and infrastructure should be focal research points to facilitate sustainable consumption.

In this paper, we consider urban space to be a potential enabler of sustainable consumption:

> *"Urban life is at the heart of the problem [climate crisis, mass extinction of biodiversity, environmental issues, etc.], and it can only be the source of the solution. Becoming aware of the existing dissociation between space and time is a key step in order to be able to question in depth our lifestyles, production and consumption, including ultimately our displacements, which are consequently large consumers of linear time"* (Moreno, 2020, n.p.).

We follow the argument that urban planning can challenge the pace of urban life (Moreno, 2019; Chair Entrepreneurship Territory Innovation, 2020; Manzini, 2022). To exemplify this, the urban form concept of the 15-minute city is applied. The 15-minute city focuses on ideas of function closeness and physical movement through walking and cycling (Moreno, 2020; Moreno et al., 2021; Allam et al., 2022; Manzini, 2022). The concept is operationalized in this paper as an inspiration that illustrates how urban planning can foster sustainable consumption practices based on *"two essential components of urban life: time and space"* (Moreno, 2019, n.p.).

The paper is structured as follows: First, the conceptual and theoretical foundation is introduced, structured around three sub-sections: theories of practices, planning for urban mobilities, and the evolution of time perceptions based on urban planning and effective mobilities. Next, the methodology is presented followed by the conceptual and theoretical foundation of empirical data on everyday practices. The empirical data is in the next part discussed with planning and we use the 15-minute city as a framing to illustrate the importance of new planning approaches. In the concluding remarks section, we point to the potential of urban planning to facilitate sustainable consumption.

Conceptual and theoretical foundations

This section lays the ground for the empirical data presented in the following section. First, we briefly introduce how theories of practices enable us to bundle and connect food, mobility, and housing practices, as well as look at their context and materials. Mobilities and urban planning shape consumption practices and here we specifically focus on the connection between time perception and sustainable consumption practices.

Theories of practice: Connected practices and their context

Theories of practice have gained interest among social researchers in conceptualizing and explaining the way living and consuming are socially and temporally organized (Reckwitz, 2002; Schatzki, 2002; Warde, 2005; Nicolini, 2009; Shove et al., 2009; Blue, 2019). Insights into how consumption practices are organized allow us to understand what drives and hinders certain practices (Warde, 2005). Exploring everyday life consumption highlights the resources (such as time, space, and objects) of importance for climate-friendly consumption, in the context where consumption "happens" (Heisserer and Rau, 2017). With a practice-theoretical approach, we are giving voice to the (mobile) everyday life, which is essential for the sustainable transition (Freudendal-Pedersen, 2022).

Traditionally, consumption of food, mobility, and housing have been researched in-depth separately to understand the practice "elements" ascribed to these specific practices (e.g.,

Gram-Hanssen, 2010; Halkier and Jensen, 2011; Shove et al., 2012; Spotswood et al., 2015; Heisserer and Rau, 2017). This paper explores connected food, mobility, and housing practices to highlight how the entangled everyday life impacts consumption practices. Theories of practices provide the opportunity to understand the connectedness between multiple socially organized, performed, and intersecting practices to, in turn, understand the drivers of social life (Schatzki, 2002; Shove et al., 2012; Castelo et al., 2021).

Moreover, within theories of practice, Schatzki (2005) argues that it is imperative to understand the context or site in which practices are performed, and Reckwitz (2002) points to how, *"objects are necessary components of many practices—just as indispensable as bodily and mental activities. Carrying out a practice very often means using particular things in a certain way"* (Reckwitz, 2002, p. 11). In this paper, these theoretical perspectives are utilized to argue that it is essential to understand the context (e.g., urban forms and cities) as well as the objects (e.g., urban infrastructure) for sustainable transitions, *"The inclusion of material aspects into practice theory is argued to be vital for understanding consumption practices, more generally, and commuting, in particular, many of which rely on complex infrastructure"* (Heisserer and Rau, 2017, p. 580). How the "complex infrastructure" has developed is unfolded in the coming section.

Mobilities and urban planning forming consumption practices

To understand how mobilities impact consumption practices, it is necessary to understand the evolution of travel and transport: Travel and transport have progressed from walking and horse-drawn carriages as the main transport modes to the technological development of the bike, the railway system, and finally the automobile. The bike *"paved the way for the car and for its subsequent domination of paths and pavements, roads and freeways"* (Urry, 2007, p. 112), and today the automobile is the dominant transport mode and it defines contemporary urban spaces (Sheller and Urry, 2000; Urry, 2004, 2007; Brown et al., 2009; Freudendal-Pedersen and Kesselring, 2018; Moreno et al., 2021). Construction of wide and comfortable roads that favor travel by automobile is still an underlying priority in the majority of urban planning (Glaeser, 2012; Kärrholm and Kopljar, 2020). Contemporary urban objects such as junctions, roundabouts, and ramps are created to control automobiles. This infrastructure defines how other mobilities, such as pedestrians or bicycles, interact with the urban context as well as other mobilities. The design of urban space is about flow and functions (such as buildings, roads, or parks) and guides and fosters certain practices (Jensen, 2013; Gwiazdzinski, 2014). Moreno et al. (2021 p. 93) write that, *"in cities, cars changed the dynamics of urban planning, opening doors for linear and perpendicular city grids and the devastating consequences of urban sprawl."* Not only did the automobile take over the urban space and mirrored the "success" of the automobile, the "success" further led to urban sprawl and flourishing suburbs (Jacobs, 1992; Urry, 2007; Glaeser, 2012; Freudendal-Pedersen and Kesselring, 2018; Moreno et al., 2021).

Not only is the physical infrastructure of importance in understanding how mobilities impact consumption practices but also social dynamics and culture (Mögele and Rau, 2020; Freudendal-Pedersen, 2022). Hence mobilities and urban planning have formed and are forming contemporary consumption practices. Consumption practices are mobile, and the mobile everyday life fosters consumption practices, *"Consumption is also increasingly mobilized today, in the sense that it is being grounded in mobility. This goes for shopping for groceries, clothes, electronics, furniture, etc., and also for cultural events, education, and so forth"* (Freudendal-Pedersen and Kesselring, 2018, p. 9). This analysis of the evolution of travel, mobilities, and urban planning clearly illustrates that contemporary practices are deeply embedded in physical locked-in and path-dependent structures in society, which not only define the physical infrastructure development but also define the social lived everyday life. As Moreno et al. (2021) put it, *"Today, our car-dependent urban planning legacy outlines deep-rooted inequalities, especially in the social and economic spheres, and has become the center for unsustainable practices"* (Moreno et al., 2021, p. 94).

The influence of mobility planning on time perceptions

In line with planning for modernity, the development of transport modes re-ordered the contours of time and space (Urry, 2007). The public transport system had clock time as a central element with the implementation of timetables, *"the objective clock-time of the modernist railway timetable constitutes a public mobilization, squeezing trains and people we might say into a given and circulated timetable"* (Urry, 2007, p. 97). The users of the railway system became dependent on clock time and transformed the modern mobile society into a system in which time should be planned tightly (Urry, 2007). As the automobile was introduced and became popular, it allowed people to be "free" from time constraints. Automobile drivers developed their own timetables in their social lives, which gave them the feeling that their dependency on someone else's clock time had been reduced.

As the automobile allowed people to move away from the strict and "tyrannical" clock time (Bissell, 2010), the automobile came to hold the promise of flexibility and freedom (Freudendal-Pedersen, 2009). With the automobile as a technology for

everyone and the introduction of the Internet, instantaneous time became part of everyday life (Urry, 2000). The opportunity to react to new impulses in a nanosecond and the expectation that others would do the same created what Eriksen (2001) calls "the tyranny of the moment" and what Bauman (2000) frames as "liquid modernity". Instantaneous time brought the expectation of efficiency, which is today inscribed in everyday life (Jouzi et al., 2021).

This modernistic and technocratic way of planning and the perception of time has produced the firmly rooted idea that "time is money" (e.g., Adam, 2003), which has become an integral part of the modern way of living and consuming. The turning point for capitalism is production, and production needs hard workers (Harvey, 1989) and, therefore, being mobile *"in part may have emerged from associated economic, business and more generally competitive neo-liberal rationales of productivity and a concern that time needs to be utilized more productively in order to be more profitable"* (Bissell, 2010, p. 280). Capitalism and neo-liberalism demand that hard-earned money is spent to maintain the system, and this circulation has put endless consumption at the center of modern everyday life (Fuchs et al., 2021); an endless consumption opportunity that in the rich and modern world leads to time pressure (Fuchs et al., 2021):

> *"Money or energy (to be spent or used) and time (to be allocated) are not balanced, and this results in an extra time pressure, which people feel in their daily lives. Unlimited access to money or energy threatens our limited time. We do not have enough time to spend the money that comes from unlimited growth. We do not have enough time to use the unlimited renewable energies that we have access to"* (Jouzi et al., 2021, p. 12).

Not only is it impossible to store time like other resources (e.g., money), but, *"people lose some 'quality time-related value' when they exchange their time for money, unless their working hours are quality time"* (Jouzi et al., 2021, p. 10). The perception of time is not only that it is a limited objective resource, but there is a lack of "quality time." However, *"extra time will not directly lead to more sustainable lifestyles unless it is properly managed. People do not want 'more free time' but 'enough time for meaningful things[2]'"* (Jouzi et al., 2021, p. 3). Changing everyday practices in a sustainable direction, perceptions of how much time is available come to the center:

> *"We know that we should do more than what might, or would most likely, be the best for ourselves and the environment, but the complex and time-pressured everyday life demands other forms of behavior than 'the right one' when there is so much knowledge that needs to be integrated when making decisions"* (Freudendal-Pedersen, 2020, p. 22).

For consumption practices to become sustainable, they need to be changed. The perception of time shows how time frames the mobile and fast-paced effective everyday life. Knowing this, it is worth emphasizing the notions of sufficiency and stillness for stimulating changes. While efficiency is about stacking activities in a way that provides the opportunity for more activities in everyday life (Eriksen, 2001), sufficiency is about reducing activities and critically relating to what is necessary; the sufficiency approach highlights changes in social values and the perception of quality of life (Fuchs and Lorek, 2005; Jouzi et al., 2021). Bissell and Fuller (2011) suggest that emphasis should be placed on the concept of "stillness" as a way of moving beyond the tyranny of efficiency and speed, *"Still here is posed as a solution to the problems of consumption, movement and activity. Still becomes enrolled as a powerful trope for environmental, economic, political and ethical sustainability"* (Bissell and Fuller, 2011, p. 6). Stillness is simply about allowing practices to slow down.

Slowing down time has received more attention in the last two decades, driven, in particular, by the fact that stress has become a common welfare disease and the COVID-19 pandemic, which brought the world to a standstill and changed everyday life for many people (Freudendal-Pedersen and Kesselring, 2021). Despite this, the idea of efficiency is an important element in everyday life. This is partly a result of the urban infrastructure, which has guided specific practices for a long time. We will discuss this with empirical findings from a research project on sustainable transition. Before moving into this discussion, we will introduce the methodology of the research project.

Methodology

The empirical data presented below is collected as part of a research project focusing on everyday practices of food, mobility, and housing, and the transition toward a sustainable everyday life. The practice-theoretical approach was adopted to understand mundane everyday life (e.g., Freudendal-Pedersen, 2022), as well as to move beyond the behavioral approach to transitions (Jackson, 2006; Strengers and Maller, 2016; Schäfer et al., 2018). As already stated, connecting food, mobility, and housing is in focus to understand the complexity of everyday life, which aligns with the practice-theoretical approach.

To understand how time is perceived in connected food, mobility, and housing practices, interviews were conducted with young adults. The empirical data is derived from semi-structured interviews, which were held with ~30 young adults (aged 25–35). The interviewees are anonymous in this paper

2 See Fuchs et al. (2021) for discussions of how the good life or "meaningful things" are related to sustainable consumption.

and, hence, details on gender, city, partner status, or similar, are not mentioned (the pronoun "they" is used). The interviews were conducted in autumn 2021 and were then transcribed and coded. The code that was activated for this paper is related to "time." Within this code, perception of time is included, both mentioned by the young adults themselves (e.g., "I don't have the time to do this") or when time was implicitly embedded (e.g., "I like to take the fastest route" or "be efficient"). We did ask the young adults about how much time they spent on different practices, but the perception of time often emerged spontaneously (e.g., "I don't have time in the mornings to do this").

The interviewed young adults differed in terms of household constellation, city, age, educational background, gender, income, and other socio-demographic factors. However, what the young adults had in common was a desire or plan to move within the coming year. Some researchers (e.g., Hunt, 2017) argue that it is within life course transitions, such as moving or having children, that people are most likely to change practices[3], which is also evident within mobility (Rau and Manton, 2016; Scheiner, 2017; Scheiner and Rau, 2020). Moving is one of the major transition phases and it is less likely to occur than changes in mobility and food practices. For this reason, it was decided that all the young adults should be in the process of moving or having a desire to move. People of this age have probably experienced major life events such as completing an education, moving in with a partner, or starting a family—events that may include a need or desire for a new housing situation. Besides this, present-day young adults are educated and raised in a time when sustainability is high on the societal and political agenda. The research topic was, therefore, not expected to be unfamiliar to them.

The young adults were living in the four largest cities in Denmark (Copenhagen, Aarhus, Aalborg, and Odense). With a population of 5.8 million inhabitants, Denmark, which is located in Northern Europe, is a relatively small country. It is often considered a frontrunner within sustainability. The capital of Denmark is Copenhagen, and 1.3 million people live in its greater region. The second largest city is Aarhus (with ∼300,000 inhabitants), followed by Odense (with ∼180,000 inhabitants), and Aalborg (with ∼120,000 inhabitants). All these cities have educational institutions and they, therefore, attract many young people for studying. In these four cities, extensive public transport systems and a large selection of supermarkets are available, and the homes are, in general, relatively small. Despite that sustainability of cities has been discussed (e.g., Day and Hall, 2016), we find it relevant to work with cities and the urban scale due to the presence of many mobility opportunities, smaller housing units, and a variety of food supplies that could be considered sustainable (e.g., Glaeser, 2012). The relevance of the urban context was thereby activated by interviewing young adults living in these cities.

3 For wider perspectives on changes of practices within life course transitions, see Schäfer et al. (2012).

Empirically framing (un)sustainable consumption practices

As the conceptual and theoretical section illustrated, mobility has for a long time impacted urban planning, perception of time, and consumption in the mobile world. The empirical data we present in the following section illustrates that instantaneous or effective time is still invading and framing everyday life consumption practices. The empirical data reveals how time perceptions limit or support sustainable practices, as well as how urban infrastructure comes into play. As stated, the empirical data predominately includes quotes related to mobility practices, as they often connect food and housing practices.

Perceived time based on effectiveness

When asked about barriers to sustainable consumption, the young adults frequently mentioned limited time in everyday life. In the following quote, a young adult expresses how they are, in general, very concerned about sustainability. However, when it comes to, especially, mobility, time wins, *"I wouldn't say that it [sustainability] always dictates my choices because sometimes time wins. Sometimes more importance is attached to time than to sustainability"* (interview October 11, 2021, translated by authors). In the following quote, the interviewee identifies the main barrier to sustainable practices:

> *"It's the time perspective. It would be obvious for me to change habits in relation to transport. But I think it takes more time, and it's more expensive to take public transport. And here time wins, the time/money view. It would be easier for me if it was faster, with more direct connections. Well, there are actually very direct connections to where I'm going, but there are so many stops on the way. It would be an obvious place to do something because I'm actually like trying to do [sustainability] stuff in other areas"* (interview October 11, 2021, translated by authors).

Time as a limited resource is what hinders this young adult from increasing the sustainability of their mobility practice. The young adult is aware that their current transport practice is unsustainable, which aligns with Freudendal-Pedersen's (2020) point about awareness of the "right" environmental practice, but time is the limiting barrier. The interviewee reflects on how the urban context could foster sustainable mobility (using public transport) but does not see the value of it. The interviewee then went on to say that time on the train could be used for something else, such as listening to a podcast or working. Either way, if time is spent on enjoyable activities ("quality time") (listening to a

podcast) or being more effective (working), this young adult may value spending time traveling on public transport more highly. The quote implies that to foster sustainable mobility, transport-time needs to be used in additional ways instead of "simply" time spent on transport. Stillness is not enough; time must be utilized effectively.

The following quote demonstrates the influence of social relationships on mobility practices, resulting in an unsustainable mobility practice:

> *"The other day at work, we went to a small city in another part of Denmark for a workshop. We went by airplane and took a taxi from the airport. It was my boss who decided that. She has two kids—that's why her time … Yeah you know, her time is something else, you could say. Or it has another value than… or how can you frame it… You know, she has a partner, and … I would feel fine by taking the train despite it being a long day. Like, I would have to leave at six or seven in the morning and then be back at like eight in the evening. It would be a long day, and I would spend more than half of the day transporting myself. The workshop would last like four hours. So that's why we decided to take the airplane"* (interview October 15, 2021, translated by authors).

Subsequently, the young adult was asked to elaborate on the time perception mentioned about the boss. To that, the young adult replied:

> *"Well, her hourly wage is higher. And then it's the whole thing about that she must be home with her family at a decent time. Like seven in the evening. That's important to her. For me, it doesn't matter if I'm home early as no one depends on me, so it doesn't matter. And now I'm thinking about it, I can absolutely see how it was not super sustainable, but yeah… that's how it goes"* (interview October 15, 2021, translated by authors).

This shows how time is perceived and valued differently. For the boss, spending time on mobility is not considered as valuable as spending time on social relationships. Moreover, the young adult points to how the boss's hourly wage is higher. Efficiency and "time is money" are embedded in understanding time perception and used as an explanation for unsustainable practices. It would have been sufficient for the young adult to take the more sustainable train but being efficient and/or having a desire to spend time with a loved one led to the unsustainable practice of flying.

One of the young adults talks about time constraints in terms of an opportunity to be efficient: *"I have this thing with efficient routes. If I'm going out, I like to bring the trash on the way, so I can do several things at the same time"* (interview October 3, 2021, translated by authors). Another young adult explains how sorting waste is dependent on their perception of time constraints: *"Often I'm not in really good time and then I prioritize catching the bus instead of sorting the waste"* (interview October 4, 2021, translated by authors). Proximity is at the forefront here: If waste management systems are near the home and sorting the waste is, hence, not time consuming, it is prioritized. The connected practices within everyday life illustrate its complexity. Understanding the complexity reveals where the barriers to or drivers of sustainable practices occur in everyday life. For the first quote here, efficiency is the driver of the sustainable practice of waste management, while the second quote shows how efficiency is a barrier to performing waste management. Either way, acknowledging that efficiency is embedded in everyday life demonstrates how it drives decisions in everyday practices.

Another element of the connected consumption practices and how time efficiency is important is exemplified in the following quote. The quote is about the daily route to and from work:

> *"I haven't chosen these supermarkets because they are the best in the city. But they just happen to be there on the way, and I don't want to spend extra time, so I sort of figured it is a good compromise that I go to these supermarkets and make the best of it"* (interview September 29, 2021, translated by authors).

Proximity is, once again, at the forefront: The supermarket near the daily route is chosen and food practices then become as sustainable as the stock in this supermarket allows. In this matter, space and the availability of different functions come together with perceived time constraints. The connectedness of food, mobility, and housing is very visible in this quote, and this is a recurrent issue with all the interviewed young adults.

Perception of limited time based on locked-in mobility planning

One young adult uses different kinds of mobilities and the decision regarding which mode to choose is often dictated by the time available. If they have enough time in the morning, they walk or bike to the station. If time is limited, they take the car to work. The daily routine is tied to the "tyrannical" clock time, which can limit sustainable practices. The young adult estimates that it takes 15 min to get to work by car, and 50 min by public transport. However, it takes 15 min, *"only if I leave at the 'right' time"* (interview October 11, 2021, translated by authors), otherwise, it takes a longer time. This brings the matter of urban space into play: The planning of the urban area is focused on easy accessibility for the automobile instead of prioritizing other more sustainable mobility modes, as pointed out earlier. This focus has meant that it is very convenient

for this young adult to take the automobile, which supports the practice of automobile driving. Another interesting element in evaluating time is what is included in the time perception for this young adult. The 50-minute trip by public transport includes the trip to and from the station, while the 15-minute trip by automobile only includes the actual drive (and not getting to the automobile and parking it). Time is perceived differently depending on the transport mode, which here leads to a preference for the more unsustainable practice of driving the automobile.

Many temporal reflections are made daily concerning the young adults' practice of going to work. One young adult explains that they calculate whether they have enough time to bike or walk in the morning, and if not, they must calculate whether they can leave the house "at the right time" by automobile in order not to be late for work. The experience of time-use defines whether the transport mode is sustainable or not. The young adult further explains that, *"it's easier to just get in the car and go to work than to plan how to take public transport, also in relation to time"* (interview October 11, 2021, translated by authors). This notion of time is supported by the primary focus on decades of planning for the automobile. Even if the young adult mentions that the automobile is only fast if they leave the house at a certain time and frames this mobility within a clock time regime, the car is still considered to be time saving and flexible. There is more value for young adults to take the automobile than not.

In the above quotes, time is given as an explanation for everyday practices. Other young adults mention time indirectly and use terms such as "easy," "fastest," or "laziness" to explain why certain practices are (not) prioritized. When asked about when they use a bike, one of the young adults answered, *"when it's the fastest option"* (interview September 29, 2021, translated by authors). The mode of transport is not (solely) based on the urban infrastructure and its services [e.g., being able to go through an enjoyable park (getting "quality time") or parking without payment], the bike is chosen when it is the fastest mode of transport. The sustainable practice of biking is chosen because it is seen as time optimizing and hence effective. One reason this is the case is the way that cycling has been planned in the big cities in Denmark, where an increasing amount of space is being allocated solely to biking. The fast pace is still prioritized when planning for biking, which is in line with the understanding of planning for efficiency. The locked-in system and mentality of planning for efficiency are upheld, though in this case while still supporting and enhancing sustainable mobility modes, i.e., biking.

Another example that displays how organizing space matters for consumption practices is seen in the case of a couple who have two automobiles available. The workplace of one of the young adults is located downtown, where it is not possible to park in close proximity to work. In contrast, the partner's workplace is located outside the city, where car parking is possible. The distance to their respective workplaces is approximately the same, but the urban form and infrastructure guides different mobility practices: One of the young adults takes public transport to work (downtown), while the other young adult takes the car (to the outskirts of town). Moreover, for this couple, their soon-to-be home is required by law to have two parking spots on the plot as automobiles must not be parked on the street. Even if residents do not own an automobile, there must still be space for two parking spots on their plot. These two examples illustrate how urban planning regulations set the agenda for everyday practices, as well as how parking spots define and foster, in these cases, sustainable and unsustainable practices. Planning for the automobile continues to be the default, and this example shows how the planning of mobilities impacts practices.

What the above sections have demonstrated is that perceived time is still used as an argument—as well as guidance—for many (un)sustainable practices. Acknowledging the importance of connecting food, mobility, and housing raises the question of how planning could play a role in ordering different space/time frames around these everyday practices. We argue that it is important that urban spaces foster proximity and connectedness within the lived (urban) space to promote sustainable practices. Having the elements necessary for everyday life, i.e., food, mobility, and housing in close proximity to each other would reduce the stress associated with instantaneous time and the expectation of having to be effective at all times. We argue that considering proximity and connectedness in the urban forms and infrastructure would support sufficient consumption practices and would benefit from the idea of stillness.

Planning for time: Introducing the 15-minute city concept

Based on the theoretical and conceptual foundation that was discussed with the empirical data, this paper demonstrates how time perceptions, urban form and infrastructure, and consumption practices are related to everyday practices. To discuss the effect on consumption practices from urban planning, the following section introduces the 15-minute city concept. We use the 15-minute city concept due to its focus on time and investigate if this can restructure everyday life and influence perceptions of time to foster sustainable practices.

The 15-minute city concept

Within the last decade, new planning concepts to encourage sustainable consumption have been envisioned and implemented around the world, one example being the 15-minute city (Da Silva et al., 2019).

> *"The 15-minute city runs counter to modern-day urban planning, in which planning by infrastructure has in some cases been a factor for spatial segregation, due to widespread functional specialization. The exacerbated separation of space and time ended up pitting the two elements against one another, stripping us of something precious to urban life, and the essence of life itself: the value of usable time. The 15-minute city is aimed at bringing living time—usable living time—back to the center of urban life, in order to preserve quality of life as a whole. It proposes a different form of living, in which our relationship to time, and above all, time in mobility, is changed"* (Chair Entrepreneurship Territory Innovation, 2020, p. 8).

The fundamental principle upon which the concept is based is that basic urban amenities should be located in close proximity[4] to urban centers so that they are within a 15-minute radius by bike or walking. These are the everyday life activities of living, working, business, healthcare, education, and entertainment. This planning concept, which very explicitly considers time and space, was introduced in 2016 by the French urban researcher, Carlos Moreno. The 15 min is an overall framing as the individual urban context determines whether it takes 5, 20, or 30 min to reach the basic urban amenities. The concept underlines the importance of proximity-based planning to ensure that basic urban amenities are reachable by sustainable mobility modes (Moreno et al., 2021; Manzini, 2022).

The concept is based on chrono-urbanism, which conceptualizes cities in terms of time: *"Chrono-urbanism proposes to integrate the temporal dimension into urban planning, to combine places, movements and time, i.e., the built environment, flows and schedules"* (Chair Entrepreneurship Territory Innovation, 2020, p. 8). Moreno et al. (2021) argue that:

> *"The proponent of this concept envisions that within a 15-min radius, residents will manage to experience a higher quality of life as they will be required to travel less to access basic facilities such as public spaces, with increased time and opportunities to interact with other members of the community and accomplish other social functions, which are increasingly important but which have been lacking as a core function of contemporary urban planning models"* (Moreno et al., 2021, p. 106).

The purpose of the 15-minute city is to limit the use of automobiles, which would reduce greenhouse gas emissions and improve the quality of urban spaces. Also, Moreno et al. (2021) emphasize that the concept is not only an approach to achieving a sustainable city but also a resilient city, which could have been valuable in the recent COVID-19 pandemic.

The focus of the 15-minute city concept is on the timely, spatial, and functional use and organization of the neighborhoods based on accessibility, proximity, and connectedness (Pozoukidou and Chatziyiannaki, 2021). This way of understanding the organization of the city has its historical roots in previous planning traditions [e.g., the compact city (Jenks et al., 1996) or central place theory (Christaller, 1933)], but it integrates this with contemporary planning needs [e.g., resilience or cities that care (Manzini, 2022)]. Sheller and Urry (2000) argue that to overcome the locked-in mobility system, changes are needed to redesign "the city of automobility." They point to approaches such as car-free zones in city centers, denser living patterns, integrated land-use patterns, and greater coordination of transport systems—all of which are elements in the 15-minute city concept.

The 15-minute city is centered around time and space. Time is an explicit defining feature and proximity is defined in terms of time. Furthermore, the use of space is anchored in time as the physical spaces and urban infrastructure have multiple uses and purposes, depending on time. The urban space and infrastructure in the 15-minute city are supposed to be shared (e.g., bikes or housing), hybrid with multiple uses (e.g., a cafe for dining and working), modular (e.g., tables for dining in the evening and workstations in the daytime), while usage can rotate (e.g., a park in the wintertime and a circus-area in the summertime). The borders between usages are blurry, which creates "third-level spaces"—a mix of different activities that take place within the same space. The spaces are used differently depending on time, which points to the importance of understanding time and space as features guiding practices.

The 15-minute city is in its early stages and no long-term evaluations of its consequences for sustainable consumption exist. Most of the critique against the idea is very much related to processes of gentrification and that it is not a new idea but more "old vine on new bottles" (Pozoukidou and Chatziyiannaki, 2021). These critiques are often based on a functionalistic urban planning tradition and often overlook the overarching time space discussions on which the idea is based on Moreno (2019, 2020), Pozoukidou and Chatziyiannaki (2021). We find the 15-minute city concept interesting to use as a reference point in the following discussion as it frames a shift from a productive, efficient, and modernistic view on urban space into a view on lived urban spaces forming human cities.

Everyday practices in the 15-minute city

Considering the above-presented perception of limited time and how the urban form and infrastructure guide consumption practices, further development and integration of the 15-minute city concept is seen as a potential approach for achieving

4 See Manzini (2022) for reflections on what "proximity" entails (e.g., geographical, social, and cognitive proximity).

sustainable cities which support sustainable consumption. The 15-minute city concept considers the need for proximity and connectedness—both of which are present in the empirical data as essential elements that foster sustainable practices.

Everyday life entails connected practices, in this research highlighted by food, mobility, and housing. The 15-minute city is based on the understanding that practices (living, working, business, healthcare, education, and entertainment) are connected. Proximity is extremely important in planning for sustainable consumption. The empirical research echoed how people want to be efficient: They prefer it when waste management services are in close proximity to their home, or when they can perform two activities at the same time such as doing grocery shopping on their daily commute. Consumption takes time, and time needs to be valuable and have meaning. If the urban form and infrastructure can support "valuable time" by providing sufficient resources within walking or biking distance, it will support the sustainable transition. Even though the 15-minute city does not explicitly point to stillness, we argue that stillness will be enhanced by proximity and connectedness. Overall, what the 15-minute city enables is an emphasis on time and space; an emphasis this research has demonstrated is essential for sustainable consumption to happen.

The relationship between (un)sustainable consumption and urban planning—concluding remarks

This paper has theoretically and empirically illustrated how time is still perceived as a limited resource in everyday life, where decisions regarding activities connected to food, mobility, and housing are being constantly made. Everyday life is tied to an understanding of being effective, which sometimes hinders sustainable consumption practices. People's perceptions of time can mean that unsustainable transport modes (e.g., the automobile or airplane) are favored as the transport mode as it makes room for other practices, or that waste management is not prioritized due to the perception of it being too time-consuming. However, the aim for efficiency does not necessarily lead to unsustainable practices; this paper asserts that the aim for efficiency can also support sustainable practices such as doing waste management on the go. Hence, efficiency must be considered to understand what drives certain practices.

Moreover, with a practice-theoretical approach, we have highlighted the importance of understanding *where* practices take place. This is to understand the full context of what makes practices happen. To this end, we point to the importance of the urban form and infrastructure in fostering consumption. A lack of time sensitivity in historical and contemporary urban planning and planning with the automobile at the center has created a framing around everyday life that challenges sustainable practices. By understanding the importance of time in a spatial context, it becomes apparent that by organizing space in a new way, the urban form and infrastructure can be activated to facilitate sustainable consumption. This paper argues that we need urban planning approaches that favor connectedness and proximity. A city that "gives more valuable time" to its inhabitants. It is suggested that the concept of the 15-minute city can do this. By living, working, doing business, healthcare, education, and entertainment within a short distance, efficiency can be related to more sustainable practices (Moreno et al., 2021). It allows for stillness and sufficiency as solutions to unsustainable consumption practices.

This paper has highlighted that the concept of the 15-minute city can meet the need for a sustainable transition while not underestimating mobile everyday life. With the title of this paper, "*Restructuring urban planning to facilitate sustainable consumption*" we wish to point to the need for further discussions on urban form and infrastructure with sustainable consumption. This might not be framed as a 15-minute city, but what is important is that attention is paid to understanding the connection between temporality and consumption practices. A critique of the 15-minute city concept may be that it will create a gentrification process, which creates highly unequal access and living conditions. However, the current planning system based on automobility is also highly unequal through its distribution of noise and pollution. Research is needed on the impact of the 15-minute city as well as a general critical approach of the concept, not least concerning inequality and mobility justice (Sheller, 2018). Most importantly, it is not necessarily the 15-minute city but also other concepts that facilitate a mobile world in which proximity and connectedness foster sufficient sustainable consumption practices that need investigation. While the empirical part of this paper was confined to Denmark, we argue that understanding connected consumption practices and their associated resources (time, space, and objects) offers valuable options for further research on sustainable transitions. Cities that are aiming for sustainability could pay attention to the importance of temporality, proximity, and a connected understanding of several consumption areas.

Data availability statement

The datasets presented in this article are not readily available, because data is sensitive personal data. Requests to access the datasets should be directed to CS, carolines@plan.aau.dk.

Author contributions

CS conducted the interviews and wrote the first draft of the article based on the empirical data collected from the interview sessions. MF-P took part in structuring, guiding, and editing the article. CS and MF-P wrote the manuscript and accountable for

the content of the work. Both authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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References

Adam, B. (2003). When time is money: contested rationalities of time in the theory and practice of work. *Theoria J. Soc. Polit. Theory* 102, 94–125. doi: 10.3167/004058103782267403

Allam, Z., Moreno, C., Chabaud, D., and Pratlong, F. (2022). "Proximity-based planning and the "15-minute city": a sustainable model for the city of the future," in *The Palgrave Handbook of Global Sustainability,* (Cham: Springer International Publishing), 1–20. doi: 10.1007/978-3-030-38948-2_178-1

Arbuthnott, K., and Scerbe, A. (2017). How do money and time restrictions influence self-constraining behavior in polluting the commons? *Organ. Environ.* 30, 211–225. doi: 10.1177/1086026616652667

Bauman, Z. (2000). *Liquid Modernity*. Cambridge; Malden, MA: Polity Press.

Bissell, D. (2010). Passenger mobilities: affective atmospheres and the sociality of public transport. *Environ. Plan. D Soc. Space* 28, 270–289. doi: 10.1068/d3909

Bissell, D., and Fuller, G., (eds.). (2011). *Stillness in a Mobile World*. London; New York, NY: Routledge.

Blue, S. (2019). Institutional rhythms: combining practice theory and rhythmanalysis to conceptualise processes of institutionalisation. *Time Soc.* 28, 922–950. doi: 10.1177/0961463X17702165

Brown, J. R., Morris, E. A., and Taylor, B. D. (2009). Planning for cars in cities: planners, engineers, and freeways in the twentieth century. *J. Am. Plann. Assoc.* 75, 161–177. doi: 10.1080/01944360802640016

Canzler, W., Kaufmann, V., and Kesselring, S. (2008). *Tracing Mobilities—Towards a Cosmopolitan Perspective,* eds. W. Canzler, V. Kaufmann, and S. Kesselring (London: Ashgate).

Castelo, A. F. M., Schäfer, M., and Silva, M. E. (2021). Food practices as part of daily routines: a conceptual framework for analysing networks of practices. *Appetite* 157:104978. doi: 10.1016/j.appet.2020.104978

Chai, A., Bradley, G., Lo, A., and Reser, J. (2015). What time to adapt? The role of discretionary time in sustaining the climate change value–action gap. *Ecol. Econ.* 116, 95–107. doi: 10.1016/j.ecolecon.2015.04.013

Chair Entrepreneurship Territory Innovation. (2020). *A Collection Dedicated to the 15 Minute City*. L'IAE Paris-Sorbonne Business School and Paris 1 Panthéon-Sorbonne University.

Christaller, W. (1933). *Die Zentralen Orte in Süddeutschland (Central Places in Southern Germany),* Transl. by C. W. Baskin. Jena: Prentice Hall.

Cresswell, T. (2006). *On the Move: Mobility in the Modern Western World*. New York, NY: Routledge.

Da Silva, D. C., King, D. A., and Lemar, S. (2019). Accessibility in practice: 20-minute city as a sustainability planning goal. *Sustainability* 12, 1–20. doi: 10.3390/su12010129

Day, J. W., and Hall, C. (2016). *America's Most Sustainable Cities and Regions*. New York, NY: Springer. doi: 10.1007/978-1-4939-3243-6

Eriksen, T. H. (2001). *Tyranny of the Moment: Fast and Slow Time in the Information Age*. London: Pluto Press.

Freudendal-Pedersen, M. (2009). *Mobility in Daily Life: Between Freedom and Unfreedom*. New York, NY: Ashgate.

Freudendal-Pedersen, M. (2020). Sustainable urban futures from transportation and planning to networked urban mobilities. *Transp. Res. D Transp. Environ.* 82, 1–11. doi: 10.1016/j.trd.2020.102310

Freudendal-Pedersen, M. (2022). *Making Mobilities Matter (1st Edn.).* New York, NY: Routledge. doi: 10.4324/9781003100515-1

Freudendal-Pedersen, M., and Kesselring, S. (2016). Mobilities, futures and the city: repositioning discourses—changing perspectives—rethinking policies. *Mobilities* 11, 575–586. doi: 10.1080/17450101.2016.1211825

Freudendal-Pedersen, M., and Kesselring, S. (2021). What is the urban without physical mobilities? COVID-19-induced immobility in the mobile risk society. *Mobilities* 16, 81–95. doi: 10.1080/17450101.2020.1846436

Freudendal-Pedersen, M., and Kesselring, S. (eds.). (2018). *Exploring Networked Urban Mobilities: Theories, Concepts, Ideas*. New York, NY: Routledge; Taylor and Francis Group. doi: 10.4324/9781315201078

Fuchs, D. A., Gumbert, T., and Sahakian, M. (2021). *Consumption Corridors: Living a Good Life Within Sustainable Limits, 1st Edn*. New York, NY: Routledge; Taylor and Francis Group. doi: 10.4324/9780367748746

Fuchs, D. A., and Lorek, S. (2005). Sustainable consumption governance: a history of promises and failures. *J. Consum. Policy* 28, 261–288. doi: 10.1007/s10603-005-8490-z

Glaeser, E. L. (2012). *Triumph of the City: How Our Greatest Invention Makes us Richer, Smarter, Greener, Healthier, and Happier*. New York, NY: Penguin Books. doi: 10.17323/1726-3247-2013-4-75-94

Gram-Hanssen, K. (2010). Residential heat comfort practices: understanding users. *Build. Res. Inf.* 38, 175–186. doi: 10.1080/09613210903541527

Gwiazdzinski, L. (2014). The malleable, adaptable metropolis: towards a temporary and temporal urbanism. *Stream Inhabit. Anthropocene* 03, 51–62.

Halkier, B., and Jensen, I. (2011). Methodological challenges in using practice theory in consumption research. Examples from a study on handling nutritional contestations of food consumption. *J. Consum. Cult.* 11, 101–123. doi: 10.1177/1469540510391365

Harvey, D. (1989). *The Condition of Postmodernity: An Enquiry into the Origins of Cultural Change.* Oxford; Cambridge, MA: Wiley-Blackwell.

Heisserer, B., and Rau, H. (2017). Capturing the consumption of distance? A practice-theoretical investigation of everyday travel. *J. Consum. Cult.* 17, 579–599. doi: 10.1177/1469540515602304

Hunt, S. (2017). *The Life Course: A Sociological Introduction, 2nd Edn*. London: Palgrave Macmillan. doi: 10.1057/978-1-137-52197-2_1

Jackson, T. (ed.). (2006). *The Earthscan Reader on Sustainable Consumption, 1st Edn*. London: Earthscan.

Jacobs, J. (1992). *The Death and Life of Great American Cities (Reissue)*. New York, NY: Vintage Books.

Jenks, M., Burton, E., and Williams, K. (eds.). (1996). *The Compact City: A sustainable Urban Form? 1st Edn*. London; New York, NY: E and FN Spon.

Jensen, O. B. (2013). *Staging Mobilities, 1st Edn.* London: Routledge. doi: 10.4324/9780203070062

Jouzi, F., Koistinen, K., and Linnanen, L. (2021). Time as a subject in sustainable consumption. *Sustainability* 13, 1–12. doi: 10.3390/su13063331

Kärrholm, M., and Kopljar, S. (2020). Built environment, ethics and everyday life. *Urban Plann.* 5, 101–105. doi: 10.17645/up.v5i4.3759

Lorek, S., and Fuchs, D. (2019). "Why only strong sustainable consumption governance will make a difference," in *A Research Agenda for Sustainable Consumption Governance,* ed O. Mont (Cheltenham; Northampton, MA: Edward Elgar Publishing), 19–34.

Manzini, E. (2022). *Liveable Proximity: Ideas for the City that Cares, 1st Edn.* Milano: Bocconi University Press.

Mögele, M., and Rau, H. (2020). Cultivating the "car state": a culturally sensitive analysis of car-centric discourses and mobility cultures in Southern Germany. *Sustainabil. Sci. Pract. Policy* 16, 15–28. doi: 10.1080/15487733.2020.1756188

Moreno, C. (2019). *The 15 Minutes-City: For a New Chrono-urbanism! Carlos Moreno*. Available online at: https://www.moreno-web.net/the-15-minutes-city-for-a-new-chrono-urbanism-pr-carlos-moreno/ (accessed December 29, 2019)

Moreno, C. (2020). *Urban Proximity and the Love for Places Chrono-urbanism, Chronotopia, Topophilia [Blog]*. Carlos Moreno. Available online at: https://www.moreno-web.net/urban-proximity-and-the-love-for-places-chrono-urbanism-chronotopia-topophilia-by-carlos-moreno/ (accessed February 21, 2020)

Moreno, C., Allam, Z., Chabaud, D., Gall, C., and Pratlong, F. (2021). Introducing the "15-Minute City": sustainability, resilience and place identity in future post-pandemic cities. *Smart Cities* 4, 93–111. doi: 10.3390/smartcities4010006

Nicolini, D. (2009). Zooming in and out: studying practices by switching theoretical lenses and trailing connections. *Organ. Stud.* 30, 1391–1418. doi: 10.1177/0170840609349875

Pozoukidou, G., and Chatziyiannaki, Z. (2021). 15-minute city: decomposing the new urban planning eutopia. *Sustainability* 13, 1–25. doi: 10.3390/su13020928

Rau, H., and Manton, R. (2016). Life events and mobility milestones: advances in mobility biography theory and research. *J. Transp. Geogr.* 52, 51–60. doi: 10.1016/j.jtrangeo.2016.02.010

Reckwitz, A. (2002). Toward a theory of social practices: a development in culturalist theorizing. *Eur. J. Soc. Theory* 5, 243–263. doi: 10.1177/13684310222225432

Schäfer, M., Hielscher, S., Haas, W., Hausknost, D., Leitner, M., Kunze, I., et al. (2018). Facilitating low-carbon living? A comparison of intervention measures in different community-based initiatives. *Sustainability* 10, 1–23. doi: 10.3390/su10041047

Schäfer, M., Jaeger-Erben, M., and Bamberg, S. (2012). Life events as windows of opportunity for changing towards sustainable consumption patterns?: Results from an intervention study. *J. Consum. Policy* 35, 65–84. doi: 10.1007/s10603-011-9181-6

Schatzki, T. R. (2002). *The Site of the Social: A Philosophical Account of the Constitution of Social Life and Change*. Pennsylvania: Pennsylvania State University Press. doi: 10.1515/9780271023717

Schatzki, T. R. (2005). Peripheral vision: the sites of organizations. *Organ. Stud.* 26, 465–484. doi: 10.1177/0170840605050876

Scheiner, J. (2017). "Mobility biographies and mobility socialisation—new approaches to an old research field," in *Life-Oriented Behavioral Research for Urban Policy,* ed J. Zhang (Japan: Springer), 385–401. doi: 10.1007/978-4-431-56472-0_13

Scheiner, J., and Rau, H. (2020). *Mobility and Travel Behaviour Across the Life Course: Qualitative and Quantitative Approaches*. Cheltenham; Northampton, MA: Edward Elgar Publishing. doi: 10.4337/9781789907810

Sheller, M. (2018). *Mobility Justice: The Politics of Movement in the Age of Extremes*. London; New York, NY: Verso.

Sheller, M., and Urry, J. (2000). The city and the car. *Int. J. Urban Reg. Res.* 24, 737–757. doi: 10.1111/1468-2427.00276

Sheller, M., and Urry, J. (2006). The new mobilities paradigm. *Environ. Plan. A* 38, 207–226. doi: 10.1068/a37268

Shove, E., Pantzar, M., and Watson, M. (2012). *The Dynamics of Social Practice: Everyday Life and How it Changes*. London: SAGE Publications Ltd. doi: 10.4135/9781446250655

Shove, E., Trentmann, F., and Wilk, R. (eds.). (2009). *Time, Consumption and Everyday Life: Practice, Materiality and Culture, 1st Edn.* London: Berg. doi: 10.5040/9781474215862

Smetschka, B., Wiedenhofer, D., Egger, C., Haselsteiner, E., Moran, D., and Gaube, V. (2019). Time matters: the carbon footprint of everyday activities in Austria. *Ecol. Econ.* 164, 1–13. doi: 10.1016/j.ecolecon.2019.106357

Spotswood, F., Chatterton, T., Tapp, A., and Williams, D. (2015). Analysing cycling as a social practice: an empirical grounding for behaviour change. *Transp. Res. F Traffic Psychol. Behav.* 29, 22–33. doi: 10.1016/j.trf.2014.12.001

Strengers, Y., and Maller, C. (Eds.). (2016). *Social Practices, Intervention and Sustainability: Beyond Behaviour Change (First Issued in Paperback)*. London; New York, NY: Routledge; Taylor and Francis Group.

Urry, J. (2000). *Sociology Beyond Societies: Mobilities for the Twenty-first Century*. London; New York, NY: Routledge.

Urry, J. (2004). The 'System' of automobility. *Theory Cult. Soc.* 21, 25–39. doi: 10.1177/0263276404046059

Urry, J. (2007). *Mobilities, 1st Edn.* Cambridge: Polity Press.

Urry, J. (2011). *Climate Change and Society*. Cambridge; Malden, MA: Polity.

Warde, A. (2005). Consumption and theories of practice. *J. Consum. Cult.* 5, 131–153. doi: 10.1177/1469540505053090

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Towards an embodied understanding of the sustainability of consumer choice—the case of fashion shopping

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This conceptual article uses an embodied theoretical lens to describe how consumption and shopping are bodily activities shaped by marketplaces. This article contributes to research on sustainable consumption in general and research on sustainable shopping in particular. The social and situated embodiment perspective highlights how sociomaterial marketplace elements configure shopping outcomes. The context of fashion shopping is used, and this article shows how an embodied view of shopping can increase our understanding of unsustainable shopping practices and promote shopping for sustainable products. This article aims to enrich the structural strand of sustainable consumption research by describing how the sustainability of individual shopping can be understood as skills and dispositions acquired within, or in relation to, marketplace activities and discourses. This suggests that current Western unsustainable fashion shopping practices, characterized by excessive consumption, change only if supply and communication practices in the fashion marketplace change.

KEYWORDS

shopping, fashion, marketplace, embodiment, learning

Introduction

This conceptual article describes how the concept of embodiment can contribute to research on sustainable consumption by highlighting how shopping as an embodied experience is shaped by the shopping marketplace. An embodied view recognizes that shopping practices reflect consumer dispositions to purchase goods and services—dispositions that to a large extent are produced and sustained by social and material elements (such as marketing communication relating specific brands to specific lifestyles and the supply of specific goods) in marketplaces.

Using the example of fashion shopping, this article illuminates how an embodied view of shopping can enrich our understanding and competence in promoting the shopping of sustainable products and, as in the case of fashion, endorse reduced shopping of novel garments.

The fashion industry faces considerable sustainability challenges as a large polluter that causes contamination of water and soil, emissions of greenhouse gases, water shortages, and social injustices (Niinimäki et al., 2020). The characteristics of fashion marketplaces and those most recognized in fast-fashion marketplaces are combinations of low-priced items with frequent product updates (Ertekin and Atik, 2015). The literature on sustainable fashion (SF) as "a broad term for clothing and behaviors that are in some way less damaging to people and/or the planet" (Mukendi et al., 2020, p. 2,873) has identified the change in shopping habits as a key research topic that needs to be addressed.

The embodied conceptualization of fashion shopping as a learned bodily response to fashion marketplaces departs from assumptions of the bodily location of perception and knowledge (Merleau-Ponty, 1962; Claycomb and Mulberry, 2007). Shopper perception is based on previous marketplace experience in as much as previous experience conditions perception (Merleau-Ponty, 1962). In essence, an embodied view of fashion shopping represents a relational view of shopping and retail environments where skills needed to shop are acquired by shopper bodies in the marketplace (Gallagher, 2005)—both as thinking and doing and in terms of the sensory experiences of seeing, hearing, touching, and feeling. This view builds on assumptions of reciprocity between the activities/structures in such environments and how shopping is experienced by shoppers (Yakhlef, 2015).

Following from the embodied view, mind-focused research efforts to understand why consumers do or do not engage in SF shopping (such as behavioral gap studies, see Shove, 2010) are unlikely to succeed (Yakhlef, 2015). From an embodied perspective, efforts to promote sustainable garments through information provision, such as eco-labeling, will not lead to any major changes in fashion shopping (Iraldo et al., 2020). The sustainable consumption literature indicates that branding discourses and subsequent competition in design and valued subjectivities structure value creation in the fashion industry (Moisander et al., 2010; Sheth et al., 2011; Solér et al., 2015). This body of the literature rarely recognizes the combined effects of marketplace practices (such as product supply/design and advertising/branding) on the promotion of sustainable shopping.

This article contributes to the sustainable consumption literature by advancing the position that purchasing sustainable products is predominantly a matter of marketplace performativity as such purchasing is shaped and circumscribed by supply and market communication practices in the marketplace which create shopper dispositions to buy certain products. Here, it is important to note that the marketplace is defined in a broad sense, including commercial and social interactions related to purchasing. For fashion shopping contexts, social media interactions as well as popular culture-related interactions that provide fashion meanings and showcase novel outfits are part of the broadly defined fashion marketplace.

The relevant literature on sustainable shopping includes the study of both macrolevel structures and microlevel meaning making (Schor, 2005; Røpke, 2009; Moisander et al., 2010; Varey, 2010; e.g. Halkier, 2013; Welch and Warde, 2015). The consumer body is absent in these bodies of literature except for discussion of how consumption/work activities compete for bodily time (Røpke, 2009). This article fills this gap in the sustainable consumption literature by using the theoretical lens of embodiment, which provides a framework for situating shopping inside the shopping context experienced by shopper bodies. The aim of this article is 2-fold: to (1) conceptualize shopping (using the context of fashion shopping) as an embodied experience and (2) outline the implications of an embodied view for the promotion of sustainable shopping.

This article adds to a structural view on how individual shopping can change. Similar to nudging literature, the embodied understanding assigns agency to the material and social environment (Thaler and Sunstein, 2009). The nudging assumption of choice architecture refers to "the informational or physical structure of the environment which influences the way in which choices are made" (Lehner et al., 2016, p. 167). Nudging tools used to promote sustainable purchasing include changing the design of retail environments and drawing attention to social norms (Thaler and Sunstein, 2009). The embodiment of perception rests on assumptions about material and social agency that are different from those on which nudging theory rests. Nudging theory follows Kahneman's (2011) theory of two different systems of thinking: one automatic and intuitive and one slow and deliberate. Based on this theoretical assumption, conclusions have been drawn that human behavior can change without changes in people's minds (Lehner et al., 2016). From the non-dualist embodiment perspective, it follows that any human experience—of nudging or any other feature in social or physical environments—leads to body–mind learning and dispositions to act (Dreyfus, 2002). These differences in how social–material environments influence individual sustainable consumer behavior have consequences for understanding and promoting sustainable shopping.

The first contribution of this article is the conceptualization of (fashion) shopping as learned skills and dispositions. Fashion shopping is an activity that is learned in the fashion marketplace. Using embodiment vocabulary, sociomaterial retail environments "afford" certain individual actions (Gibson, 1979). This article suggests that fashion marketplace affordances and fashion shopper bodily skills develop in tandem.

The second contribution of this article adds to the scientific critique of the relevance of attitude–behavior gap research (Shove, 2010) for the purpose of promoting shopping for sustainable products. The relational view of the shopper and the shopping marketplace, represented by the embodied perspective, questions the potential uses of the behavioral gap body of sustainable consumption research (Lönnqvist et al., 2013; Steg et al., 2014; Davies and Gutsche, 2016) and suggests

that it downplays research on marketplace structures. Thus, this article challenges the dominance of cognitive solution-oriented research, such as the SHIFT framework (White et al., 2019). Rather, it proposes that an embodied view that situates the responsibility for sustainable shopping in marketplaces is a powerful tool for realizing sustainable consumption (Sheth et al., 2011).

This article is organized as follows. First, a review of the research relevant to sustainable shopping outlines how the body is missing in these studies. In the second part, the ontological position of embodiment and how it has guided the literature that forms the basis for the embodied conceptualization of fashion shopping are described. Third, the results are presented as an embodied understanding of shopping using the example of fashion shopping. In the fourth section, implications for the promotion of sustainable shopping are discussed. In the concluding section, conclusion for the sustainable consumption literature in general is discussed.

Literature review of embodied shopper experience in sustainable consumption literature

The literature relevant to sustainable shopping includes both the study of macrolevel structures and microlevel knowledge and meaning. The literature on dominant shopping marketplace structures, such as advertising, branding, and supply and pricing practices, and studies of structural lock-in mechanisms in consumer cultures (such as those related to the material intensity of consumption and working hours) provide valuable insights into why—despite climate change and increasing biodiversity losses—unsustainable shopping practices are sustained (e.g. Schor, 2005; Røpke, 2009; Moisander et al., 2010; Varey, 2010; Solér et al., 2015). Practice theory-oriented studies on sustainable consumption are categorized as macrolevel understandings of sustainable consumption, as "the practice turn" emphasizes the collective and routine character of consumption (Halkier, 2013). As theories of practice downplay individual agency and offer explanations of (un) sustainable consumption based on sociocultural and material systems of infrastructures, innovation, routines, and understandings (Welch and Warde, 2015), there is little room for bodily agency. Practice-oriented accounts of sustainable consumption discuss the body mainly in terms of bodily time spent performing various competing social practices, not as an organism acting within an experienced lifeworld (Røpke, 2009; Shove et al., 2012; Wilhite, 2012).

Individualistic approaches to sustainable consumption, such as the cognitive-based environmental psychology literature, focus on attitudes and values to explain proenvironmental consumer behavior (Stern, 2000; Tanner and Wölfing Kast, 2003; Bamberg and Möser, 2007). Cognitive constructs, such as attitudes and values, are contested as indicators of proenvironmental consumer choice, and this phenomenon has been labeled the attitude–behavior gap (Vermeir and Verbeke, 2006; Gupta and Ogden, 2009; Young and Middlemiss, 2012), the knowledge-to-action gap (Markkula and Moisander, 2012), or the value–action gap (Shove, 2010; Steg, 2015). One explanation for such gaps is put forward by Linda Steg: Only consumers whose proenvironmental values are activated and supported are likely to engage in sustainable consumption (Steg and Vlek, 2009; Steg, 2015).

The culturally informed strand of sustainable consumer research is concerned with consumers' perceptions of sustainable consumption as part of identity making (Autio et al., 2009; Cherrier et al., 2012). This stream of research is equally based on cognitive/narrative constructs, such as meaning and discursively described emotion. This stream departs from consumer discourse and ideology and describes how consumers balance environmental awareness and social affiliation through consumption (Thompson and Haytko, 1997; Belk et al., 2003; Roux and Korchia, 2006; Connolly and Prothero, 2008; Autio et al., 2009; Markkula and Moisander, 2012; Mikkonen et al., 2013).

In both of these cognitively biased streams of research (focusing on macrolevel structures or microlevel knowledge and meaning), sustainable purchasing practices, including reduced or alternative consumption, are viewed as a means of identification or enacting proenvironmental values within the dominant cultural codification system (Prothero and Fitchett, 2000; Dolan, 2002; Connolly and Prothero, 2008; Autio et al., 2009; Prothero et al., 2010; Abrahamse and Steg, 2013; Steg, 2015). The body is missing as the site for thoughts and emotions. An embodied perspective on the sustainability of shopping has the potential to clearly outline how shopper bodies (including their minds) are influenced by marketplace structures and cultures through bodily encounters in marketplaces. This article fills an important gap in the sustainable consumption literature relevant to the purchasing of sustainable products and services by describing how, in the context of fashion shopping, marketplace supply and communicating practices shape the fashion shopper experience.

Methods and materials

As noted above, the embodied conceptualization of fashion shopping implies an interactive relationship between this kind of shopping and the sociomaterial fashion marketplace that create shopper dispositions to act. Prior embodied shopping research strongly focuses on how retail environments shape shopper sensory experiences and invite imagination and meaning making (Penaloza, 1998; Kozinets et al., 2002;

Borghini et al., 2009; Stevens et al., 2019). For example, embodiment is the understanding of how "sensory attributes of products, advertisements, and retail spaces influence consumers' thoughts, feelings, and decisions" (Krishna and Schwarz, 2014, p. 162). According to Gärtner (2013), these studies represent an intelligible embodiment approach that describes how bodily sensory encounters shape shopper perception. This article represents a situated and socially embodied approach (Gärtner, 2013) where marketplace material set-ups, sensory stimuli, *as well as* social norms shape shopper perception and product choice. In line with this thinking, two broad categories of literature—marketing literature *and* consumer studies relevant for fashion shopping—were collected and screened. First, bodies of marketing literature were screened for research on the sociomaterial characteristics of fashion shopping marketplaces (defined in the broad sense, including social interactions and consumer culture ideology). These bodies of marketing literature include branding, brandscapes, fashion marketing, retail marketing, experiential marketing, and critical marketing. Second, bodies of literature were screened for fashion shopper experiences, including consumer culture/material culture studies and retail therapy research, as well as a wide range of psychological studies on environmental psychology, materialism, information processing and information overload, compulsive consumption, and compensatory consumption. The screening process aimed to collect articles that contributed to an empirically based and/or fine-grained understanding of how fashion items are supplied and communicated in the fashion marketplace *and* how fashion marketplaces are experienced by fashion shoppers. Thus, articles were collected based on their relevance for an embodied analysis *of links* between marketing practices (the communication of a continuous supply of novel garments) in fashion marketplaces *and* fashion shopper experiences. The analysis of relevant articles follows the assumed relationship of reciprocity between shoppers' direct experience in fashion marketplaces and their perception of such marketplaces. Hence, relevant articles were analyzed with the aim of *uncovering themes* regarding how (combinations of) marketing practices are linked to shopper experience and buying behavior. The embodied account of fashion shopping below is organized to bridge the sociomaterial characteristics of fashion shopping marketplaces *with* the shopper experience of socially valued and desirable novel fashion.

This article adds a performative understanding to the sustainable consumption and sustainable shopping literature. Such a view essentially describes that marketing activities have formative effects on shopper motivation. The embodied understanding of fashion shopping can be used to inform the promotion of sustainable shopping using combinations of supply and communication practices. However, there is a need to empirically validate the exact links between combinations of marketing practices and outcomes in terms of shopper experience and buying behavior. The limitations of this novel theoretical perspective adhere to the variations in individual shopper experiences inherent in the phenomenological view on perception. The methods suitable for studying links between marketing practice and shopper perception and buyer behavior in shopping marketplaces are limited.

Results

The context of fashion shopping provides ample scientific evidence *of links* between fashion shopping marketplace characteristics, such as communication of a continuous supply of novel garments in fashion marketplaces, *and* fashion shopper experiences.

Fashion shopping marketplace characteristics

Fashion marketplaces are characterized by seasonal trends and frequent style modifications through launches of new collections or products (Ertekin and Atik, 2015). Product replacement, as a specific type of product development, is used by the fashion industry to create consumers' desire to constantly update their wardrobes (Moisander et al., 2010). Fast-fashion brands work intensively with product replacement, and the number of clothing collections compared with that in pre-2000 has doubled, resulting in a 2% yearly increase in clothing production (Niinimäki et al., 2020).

Most recognized in fast-fashion marketplaces, but an intimate part of all fashion marketplaces is the communication of fashion items using idealized ideals. Fashion updates are represented as part of new and up-to-date lifestyles that create a desire in consumers to continuously update their fashion arsenal (Cline, 2012). The psychological literature provides evidence of the impact of such marketplace practices on shopper motivation. Marketplaces endowed with culturally valued continuous product updates, such as fashion marketplaces, trigger a restless search for the "right outfit" or the "right arsenal of products" (Clarke and Miller, 2002; Woodward, 2006). In the fashion shopping marketplace, which in a broad sense includes not only retail environments but also social interactions related to what fashion items to shop for (including social media as well as in printed and broadcasted media), the social and cultural values of novel fashion items are constantly presented. The social value of novelty can take the form of vintage or remade garments but is most commonly represented in fast-fashion marketplaces. Conventional advertising practices and influencers, popular culture representatives, and journalists play an important role in performing novel fashion shopping as an intimate part of

a socially and culturally updated lifestyle (e.g. Shin and Lee, 2021). The performative character of branding and advertising practices in the fashion shopping marketplace shapes the shopper experience by engaging shoppers in a constant search for novel, idealized identities materialized as novel fashion items (Arvidsson, 2005; Caruana and Crane, 2008). Theoretically, such marketing practices are built on the governance of shopper free will by positioning novel fashion garments as socially valued ideals (Arvidsson, 2005; Moisander et al., 2010).

The frequency with which novel fashion items are launched on the market and the use of idealized imagery and digital marketing techniques create an intense sensory atmosphere. The sensory input-rich properties of physical fashion retail environments, including music, color, scent, personnel, and other customers, provide shoppers' bodies with sensory experiences that have overloading properties (Solér, 2018). In digital retail environments, brands engage in constant efforts to increase consumers' brand-related activities (Cova et al., 2011). The use of tailored and algorithm-based pop-up/pop-under advertising is an example of how intense sensory information is provided in fashion marketplaces (Schmitt, 1999; Tynan and McKechnie, 2009) "in forms with which our senses and prior experiences are ill-equipped to deal" (Bawden and Robinson, 2009, p. 5).

Fashion shopper experience: Overload and shop for social survival

The frequent supply of novel fashion items, the use of idealized imagery, and the sensory information load in fashion marketplaces are paralleled by fashion shoppers' experiences of feelings of information overload and anxiety-driven social survival shopping.

Fashion shopping includes seeing (and touching in physical marketplaces), listening to in-store music and advertisements, smelling, and meeting and interacting with fellow shoppers, influencers, and staff, all of which contribute to potential shopper sensory overload. Sensory overload load means "receiving too much information" and is recognized as an experiential circumstance that can cause stress at the individual level (Pearlin, 1989). Receiving too much information means that the information perceived has exceeded the limits of humans' information-processing capacity (Scammon, 1977; Malhotra, 1982; Luce, 1998). From an embodied perspective, sensory overload is accompanied by bodily experiences of elevated arousal. Bodily arousal is "the degree to which a person feels excited, stimulated, alert, or active in the situation" (Donovan and Rossiter, 1982, p. 38). The literature suggests that retail environments that involve intense stimuli cause higher levels of arousal and produce feelings of overload, such as confusion, anxiety, and stress (Donovan and Rossiter, 1982; Groeppel-Klein, 2005; Van Rompay et al., 2012).

Fashion shopping for new versions of products that are valued and bought for reasons of social desirability and acceptance (Moisander et al., 2010; Niinimäki and Hassi, 2011) points to threat-like qualities of refraining from such shopping. The literature recognizes that fashion shopping positively affects insecurity and self-esteem (Clarke, 2001; Ling and Yttri, 2002; Gram-Hanssen and Bech-Danielsen, 2004; Katz and Sugiyama, 2006; Atalay and Meloy, 2011; Rafferty, 2011; Mikkonen et al., 2013). Shopping for novel fashion items is understood as a form of anxiety reduction, as such shopping makes you the person who you are expected to be, thus making you feel better (Miller, 2001, 2009; Woodruffe-Burton and Elliott, 2005; Dittmar, 2008). Shopping for fashion objects is linked to a multitude of identity meanings, sometimes causing confusion related to what fashionable garments to buy (Clarke and Miller, 2002; Halliwell et al., 2007; Dittmar, 2008; Burroughs et al., 2013). Negative emotions, such as confusion and anxiety, spur the acquisition and use of products, such as fashionable garments for self-construction and self-maintenance purposes (Burroughs et al., 2013; Richins, 2013; Shrum et al., 2014). Studies on fashion consumption clearly show that fashion meanings and feelings are related to insecurity, anxiety, and self-assurance, and the fashion marketplace is a sphere in which individual identification and social differentiation are negotiated (Thompson and Haytko, 1997; Banister and Hogg, 2004).

The mechanism behind the threat-like qualities of not buying novel fashion items is described in psychological studies on shoppers' "think ideal, feel bad" sequence that is shaped and sustained by the promotion of commoditized idealized identities in marketing practices (Halliwell and Dittmar, 2004; Halliwell et al., 2007). Evidence suggests that idealized product-related images produce negative self-images and identity deficits among consumers (Dittmar, 2008). For example, idealized models in advertising increase the discrepancies between ideal and actual self-perceptions (Sobol and Darke, 2014). The intense use of idealized imagery and social media to communicate the social desirability of novel fashion in fashion marketplaces makes it highly probable that "think ideal, feel bad" mechanisms produce fashion shopping for reasons of social survival.

Discussion—implications for the promotion of sustainable shopping

The embodied conceptualization of fashion shopping has important implications for the promotion of sustainable products in shopping marketplaces. As previously discussed, an embodied understanding of shopping that is firmly situated in a phenomenology of perception (Merleau-Ponty,

1962) makes the promotion of shopping for sustainable products a matter of how shopping marketplace practices can support such shopping. From this position, the promotion of sustainable shopping (which in the case of fashion shopping entails shopping less and shopping sustainable products) is more about how marketing practices can be reconfigured to support sustainable shopping (Solér et al., 2015) and less about the responsibilization of shoppers through information provision.

Marketplace learning instead of information provision as a route to SF shopping

According to the embodied understanding of fashion shopping, excessive and unsustainable levels of (fashion) shopping can be curbed if marketplace supply and communication practices change (Sheth et al., 2011). The philosophical foundation of embodiment emphasizes how human experience is culturally specific and learned (Gallagher, 2005; Yakhlef, 2015). From the insight that fashion shopping is a learned activity based on skills acquired in fashion marketplaces, the concept of learning how to shop in a sustainable manner becomes a route toward changing the current unsustainable fashion consumption. Fashion marketplace learning is material and social. To this end, fashion marketplace learning would entail substantial changes in current marketing practices. Marketplace learning implies a responsibilization of fashion producers and retailers as well as influential norm providers in fashion marketplaces. Changing fashion supply practices, such as heavily reducing the number of novel product updates and collections launched on the market, coupled with market communication practices that create meanings of beauty and function through classical and long-lasting design (possibly by the use of idealized imaginary), would be a possible route toward the acquisition of shopper skills aligned with a sustainability agenda.

Why does information not help promote the shopping of sustainable products?

The proposed embodied framework enriches the understanding of value–attitude–behavior gaps in the context of fashion shopping by assuming that shopping motivations reflect the sociomaterial features of fashion marketplaces. From an embodied perspective, shopping motivations are "prereflective and non-deliberative, matching our perceptual capacities with the demands and calls for action of the environment" (Yakhlef, 2015, p. 9). This position challenges dualist understandings of shopper cognition conceptualized as attitudes and/or values and studied as phenomena separated from the context of experience.

A relational embodied view of the shopper and the shopping marketplace questions the efficacy of using information to change shopper attitudes and values to make them engage in sustainable consumption practice (Steg et al., 2014; Davies and Gutsche, 2016; White et al., 2019). In the fashion context, shoppers' thinking about green fashion and shopping behavior is inconsistent (Jacobs et al., 2018). The embodiment perspective does not contest the value in knowing about behavioral gaps per se but, similar to Shove (2010) in her critique of ABC studies in the sustainable consumption realm, such cognitive-based studies obscure sociomaterial measures that can have a real impact on sustainable consumption.

Given the previously provided embodied account of the links between acquired dispositions to shop for novel fashion items and fashion marketplaces affordances, it is problematic to conceptualize the sustainability of fashion shopping as a matter of gaps between attitudes/values and behavior. In the value–attitude–behavior body of sustainable consumption research, conflicting values, such as proenvironmental values (Dunlap et al., 1983; Lönnqvist et al., 2013) and self-transcendence/self-enhancement values (e.g. Steg et al., 2014)—for which, for example, fashion shopping is seen as enhancing social status (e.g. Davies and Gutsche, 2016)—are seen as explanations of why consumer attitudes as indicators of knowledge do not always lead to behavior. Additionally, the lack and cost of sustainable apparel (e.g. Hassan et al., 2016) and personal sacrifices in fashionable appearance and lifestyle when buying sustainable apparel (Jägel et al., 2012) are hypothesized to explain such behavioral gaps. From an embodied perspective, explaining and trying to understand the gaps between cognitive constructs and behavior in shopping contexts is inefficient and costly. Fashion shoppers do not walk their talk (Jacobs et al., 2018), and it is time to start focusing on the real change agents in shopping marketplaces: business owners, marketing managers, and supply chain officers.

Conclusion

The example of fashion shopping as an embodied consumer experience presented in this article has implications for sustainable consumption research in general. It suggests that consumption is a bodily endeavor that cannot change without changing bodily experiences in marketplaces. Hence, changing what products are supplied with the support of market communication normalizing and possibly idealizing such products—will result in changing consumer skills and product choice. A change in fashion shopping norms that includes buying clothes less often would make room for the higher costs of producing garments made in an environmentally and socially sustainable manner. Such price

increases will motivate support policies for the financially disadvantaged for reasons of social sustainability in the affluent West.

Consumption of sustainably made garments will increase if such garments are widely available, relatively cheaper than unsustainable garments, and fashionable (representing socially valued identity positions). Reduced consumption of novel clothing will be made possible by access to pre-owned clothing and/or upgraded clothing at a larger scale and to significantly lower price compared with novel clothing. Market infrastructures such as support for garment upgrading and clothes repair and political measures to reverse the price differentials between sustainably made and upgraded clothes on the one hand (in most cases are more expensive than unsustainable alternatives), unsustainable clothes on the other hand, will actively promote sustainable clothes consumption. The adverse climate and environmental impact of non-organic cotton farming (Delate et al., 2021) would justify price increases enabled by a climate-related tax or similar mechanisms that increase the relative price of climate-intensive products. Further measures that need to be taken to promote sustainable clothing consumption are the regulation of sustainability certification schemes of textiles. Such certification schemes have an important impact on the supply of sustainably produced garments in fashion marketplaces. The Better Cotton Initiative (BCI) is a sustainability certification scheme that exemplifies a very successful large-scale certification of cotton that includes the use of pesticides and GMO seeds (BCI, 2022). The price differential between BCI cotton and organic certified cotton (no pesticides or GMO seed allowed) is advantageous for fashion producers and retailers that supply and sell sustainable cotton garments certified according to the BCI scheme as fashion consumers lack the ability to distinguish between different interpretations of sustainable cotton (Horne, 2009).

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding authors.

Author contributions

The author confirms being the sole contributor of this work and has approved it for publication.

Conflict of interest

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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References

Abrahamse, W., and Steg, L. (2013). Social influence approaches to encourage resource conservation: a meta-analysis. *Glob. Env. Chang.* 23, 1773–1785. doi: 10.1016/j.gloenvcha.2013.07.029

Arvidsson, A. (2005). Brands: a critical perspective. *J. Consum. Cult.* 5, 235–258. doi: 10.1177/1469540505053093

Atalay, A. S., and Meloy, M. G. (2011). Retail therapy: a strategic effort to improve mood. *Psychol. Market.* 28, 638–659. doi: 10.1002/mar.20404

Autio, M., Heiskanen, E., and Heinonen, V. (2009). Narratives of 'green' consumers—the antihero, the environmental hero and the anarchist. *J. Consum. Behav.* 8, 40–53 doi: 10.1002/cb.272

Bamberg, S., and Möser, G. (2007). Twenty years after Hines, Hungerford, and Tomera: a new meta-analysis of psycho-social determinants of pro-environmental behavior. *J. Environ. Psychol.* 27, 14–25. doi: 10.1016/j.jenvp.2006.12.002

Banister, E., and Hogg, M. (2004). Negative symbolic consumption and consumers' drive for self-esteem: the case of the fashion industry. *Eur. J. Market.* 38, 850–868. doi: 10.1108/03090560410539285

Bawden, D., and Robinson, L. (2009). The dark side of information: overload, anxiety and other paradoxes and pathologies. *J. Inf. Sci.* 35, 180–191. doi: 10.1177/0165551508095781

BCI (2022). *Better Cotton Initiativ*. Available online at: https://bettercotton.org/ (accessed July 15, 2022).

Belk, R., Ger, G., and Askegaard, S. (2003). The fire of desire: a multisited inquiry into consumer passion. *J. Consum. Res.* http://www.jstor.org/action/showPublication?journalCode=jconsrese 30, 326–351. doi: 10.1086/378613

Borghini, S., Diamond, N., Kozinets, R. V., McGrath, M. A., Muñiz Jr, A. M., and Sherry Jr, J. F. (2009). Why are themed brandstores so powerful? Retail brand ideology at American girl place. *J. Retail.* 85, 363–375. doi: 10.1016/j.jretai.2009.05.003

Burroughs, J., Chaplin, L., and Pandelaere, M. (2013). Using motivation theory to develop a transformative consumer research agenda for reducing materialism in society. *J. Public Policy Market.* 32, 18–31. doi: 10.1509/jppm.10.046

Caruana, R., and Crane, A. (2008). Constructing consumer responsibility: exploring the role of corporate communications. *Organ. Stud.* 29, 1495–1519. doi: 10.1177/0170840607096387

Cherrier, H., Szuba, M., and Özçaglar-Toulouse, N. (2012). Barriers to downward carbon emission: exploring sustainable consumption in the face of the glass floor. *J. Market. Manag.* 28, 397–419. doi: 10.1080/0267257X.2012.658835

Clarke, A. (2001). "The aesthetics of social aspiration," in *Home Possessions,* eds. D. Miler (Oxford: Berg), pp. 23–47. doi: 10.4324/9781003085607-3

Clarke, A., and Miller, D. (2002). Fashion and anxiety. *Fashion Theory* 6, 191–213. doi: 10.2752/136270402778869091

Claycomb, B., and Mulberry, G. (2007). Praxis, language, dialogue. *Hum. Aff.* 17, 182–194. doi: 10.2478/v10023-007-0016-7

Cline, and, Elizabeth, L. (2012). *Overdressed: The Shockingly High Cost of Cheap Fashion*. New York, NY: Penguin.

Connolly, J., and Prothero, A. (2008). Green consumption: life-politics, risk and contradictions. *J. Consum. Cult.* 8, 117–145. doi: 10.1177/1469540507086422

Cova, B., Dalli, D., and Zwick, D. (2011). Critical perspectives on consumers' role as 'producers': broadening the debate on value co-creation in marketing processes. *Market. Theory* 11, 231–241. doi: 10.1177/1470593111408171

Davies, I. A., and Gutsche, S. (2016). Consumer motivations for mainstream "ethical" consumption. *Eur. J. Market.* 50, 1326–1347. doi: 10.1108/EJM-11-2015-0795

Delate, K., Heller, B., and Shade, J. (2021). Organic cotton production may alleviate the environmental impacts of intensive conventional cotton production. *Renew. Agric. Food Syst.* 36, 405–412. doi: 10.1017/S1742170520000356

Dittmar, H. (2008). *Consumer Culture, Identity and Well Being*. New York, NY: Psychology Press. doi: 10.4324/9780203496305

Dolan, P. (2002). The sustainability of "sustainable consumption. *J. Macromarket.* 22, 170–181. doi: 10.1177/0276146702238220

Donovan, R., and Rossiter J. (1982). Store atmosphere: An environmental psychology approach. *J. Retail.* 58, 34–57.

Dreyfus, H. L. (2002). Intelligence without representation—Merleau-Ponty's critique of mental representation the relevance of phenomenology to scientific explanation. *Phenomenol. Cogn. Sci.* 1, 367–383. doi: 10.1023/A:1021351606209

Dunlap, R. E., Grieneeks, J. K., and Rokeach, M. (1983). "Human values and pro-environmental behavior," in *Energy and Material Resources. Attitudes, Values, and Public Policy,* ed. W. D. Conn (Boulder CO: Westview Press*),* pp.145–168. doi: 10.4324/9780429049521-8

Ertekin, Z. O., and Atik, D. (2015). Sustainable markets: motivating factors, barriers, and remedies for mobilization of slow fashion. *J. Macromarket.* 35, 53–69. doi: 10.1177/0276146714535932

Gallagher, S. (2005). *How the Body Shapes the Mind*. New York, NY: Oxford University Press. doi: 10.1093/0199271941.001.0001

Gärtner, C. (2013). Cognition, knowing and learning in the flesh: six views on embodied knowing in organization studies. *Scand. J. Manag.* 29, 338–352. doi: 10.1016/j.scaman.2013.07.005

Gibson, J. J. (1979). "The theory of affordances," in *The Ecological Approach to Visual Perception*, ed. J. J. Gibson (New York, NY: Psychology Press*)*, pp. 127–143.

Gram-Hanssen, K., and Bech-Danielsen, C. (2004). House, home and identity from a consumption perspective. *Hous. Theory Soc.* 21, 17–26. doi: 10.1080/14036090410025816

Groeppel-Klein, A. (2005). Arousal and consumer in-store behavior. *Brain Res. Bull.* 67, 428–437. doi: 10.1016/j.brainresbull.2005.06.012

Gupta, S., and Ogden, D. T. (2009). To buy or not to buy? A social dilemma perspective on green buying. *J. Consum Market.* 26, 376–391. doi: 10.1108/07363760910988201

Halkier, B. (2013). Routinisation or reflexivity? Consumers and normative claims for environmental consideration. In *Ordinary Consumption* (London: Routledge), pp. 33–52. doi: 10.4324/9780203381502-6

Halliwell, E., and Dittmar, H. (2004). Does size matter? The impact of model's body size on women's body-focused anxiety and advertising effectiveness. *J. Soc. Clin. Psychol.* 23, 104–122. doi: 10.1521/jscp.23.1.104.26989

Halliwell, E., Dittmar, H., and Orsborn, A. (2007). The effects of exposure to muscular male models among men: exploring the moderating role of gym use and exercise motivation. *Body Image* 4, 278–287. doi: 10.1016/j.bodyim.2007.04.006

Hassan, L. M., Shiu, E., and Shaw, D. (2016). Who says there is an intention–behavior gap? Assessing the empirical evidence of an intention–behavior gap in ethical consumption. *J. Bus. Ethic.* 136, 219–236. doi: 10.1007/s10551-014-2440-0

Horne, R. E. (2009). Limits to labels: the role of eco-labels in the assessment of product sustainability and routes to sustainable consumption. *Int. J. Consum. Stud.* 33, 175–182. doi: 10.1111/j.1470-6431.2009.00752.x

Iraldo, F., Griesshammer, R., and Kahlenborn, W. (2020). The future of ecolabels. *Int. J. Life Cycle Assess.* 25, 833–839. doi: 10.1007/s11367-020-01741-9

Jacobs, K., Petersen, L., Hörisch, J., and Battenfeld, D. (2018). Green thinking but thoughtless buying? An empirical extension of the value-attitude-behavior hierarchy in sustainable clothing. *J. Clean. Prod.* 203, 1155–1169. doi: 10.1016/j.jclepro.2018.07.320

Jägel, T., Keeling, K., Reppel, A., et al. (2012). Individual values and motivational complexities in ethical clothing consumption: a means-end approach. *J. Market. Manag.* 28, 373–396. doi: 10.1080/0267257X.2012.659280

Kahneman, D. (2011). *Thinking, Fast and Slow*. New York, NY: Macmillan (2015).

Katz, J. E., and Sugiyama, S. (2006). Mobile phones as fashion statements: evidence from student surveys in the US and Japan. *New Med. Soc.* 8, 321–337. doi: 10.1177/1461444806061950

Kozinets, R. V., Sherry, J. F., DeBerry-Spence, B., et al. (2002). Themed flagship brand stores in the new millennium: theory, practice, prospects. *J. Retail.* 78, 17–29. doi: 10.1016/S0022-4359(01)00063-X

Krishna, A., and Schwarz, N. (2014). Sensory marketing, embodiment, and grounded cognition: a review and introduction. *J. Consum. Psychol.* 24, 159–168. doi: 10.1016/j.jcps.2013.12.006

Lehner, M., Mont, O., and Heiskanen, E. (2016). Nudging—a promising tool for sustainable consumption behavior? *J. Clean. Prod.* 134, 166–177. doi: 10.1016/j.jclepro.2015.11.086

Ling, R., and Yttri, B. (2002). 10 Hyper-coordination via mobile phones in Norway. *Perp. Contact* 139. doi: 10.1017/CBO9780511489471.013

Lönnqvist, J.-E., Verkasalo, M., Wichardt, P., et al. (2013). Personal values and prosocial behavior in strategic interactions: distinguishing value-expressive from value-ambivalent behaviors. *Eur. J. Soc. Psychol.* 43, 554–569. doi: 10.1002/ejsp.1976

Luce, M. F. (1998). Choosing to avoid: coping with negatively emotion-laden consumer decisions. *J. Consum. Res.* 24, 409–433. doi: 10.1086/209518

Malhotra, N. K. (1982). Information load and consumer decision making. *J. Consum. Res.* 8, 419–430. doi: 10.1086/208882

Markkula, A., and Moisander, J. (2012). Discursive confusion over sustainable consumption: a discursive perspective on the perplexity of marketplace knowledge. *J. Consum. Policy* 35, 105–125. doi: 10.1007/s10603-011-9184-3

Merleau-Ponty, M. (1962). *Phenomenology of Perception*. London: Routledge.

Mikkonen, I., Vicdan, H., and Markulla, A. (2013). What not to wear? Oppositional ideology, fashion, and governmentality in wardrobe self-help. *Consum. Markets Cult* 17, 254–73. doi: 10.1080/10253866.2013.778174

Miller, D. (2001). "Behind closed doors", in *Home Possessions: Material Culture Behind Closed Doors*, eds. D. Miller (Oxford: Berg), pp. 1–23. doi: 10.4324/9781003085607-1

Miller, D. (2009). "Buying time", in *Time, Consumption and Everyday Life: Practice, Materiality and Culture, eds.* E. Shove, F. Trentmann, and R. Wilk (Oxford: Berg), pp. 157–170. doi: 10.5040/9781474215862-ch-010

Moisander, J., Markkula, A., and Eräranta, K. (2010). Construction of consumer choice in the market: challenges for environmental policy. *Int. J. Consum. Stud.* 34, 73–79. doi: 10.1111/j.1470-6431.2009.00821.x

Mukendi, A., Davies, I., Glozer, S., et al. (2020). Sustainable fashion: current and future research directions. *Eur. J. Market.* 54, 2873–2909. doi: 10.1108/EJM-02-2019-0132

Niinimäki, K., and Hassi, L. (2011). Emerging design strategies in sustainable production and consumption of textiles and clothing. *J. Clean. Prod.* 19, 1876–1883. doi: 10.1016/j.jclepro.2011.04.020

Niinimäki, K., Peters, G., Dahlbo, H., Perry, P., Rissanen, T., and Gwilt, A. (2020). The environmental price of fast fashion. *Nat. Rev. Earth Environ.* 1, 189–200. doi: 10.1038/s43017-020-0039-9

Pearlin, L. I. (1989). The sociological study of stress. *J. Health Soc. Behav.* 30, 241–256. doi: 10.2307/2136956

Penaloza (1998). Just doing it: a visual ethnographic study of spectacular consumption behavior at Nike Town. *Consum. Market. Cult.* 2, 337–400. doi: 10.1080/10253866.1998.9670322

Prothero, A., Dobscha, S., Freund, J., Kilbourne, W. E., Luchs, M. E., Ozanne, L. K., and Thøgersen, J. (2010). Sustainable consumption: opportunities for consumer research and public policy. *J. Publ. Policy Market.* 30, 31–8 doi: 10.1509/jppm.30.1.31

Prothero, A., and Fitchett, J. A. (2000). Greening capitalism: opportunities for a green commodity. *J. Macromarket.* 20, 46–55. doi: 10.1177/0276146700201005

Rafferty, K. (2011). Class-based emotions and the allure of fashion consumption. *J. Consum. Cult.* 11, 239–260. doi: 10.1177/1469540511403398

Richins, M. L. (2013). When wanting is better than having: Materialism, transformation expectations, and product-evoked emotions in the purchase process. *J. Consum. Res.* 40, 1–18. doi: 10.1086/669256

Røpke, I. (2009). Theories of practice—new inspiration for ecological economic studies on consumption. *Ecol. Econ.* 68, 2490–2497. doi: 10.1016/j.ecolecon.2009.05.015

Roux, D., and Korchia, M. (2006). Am i what i wear? An exploratory study of symbolic meanings associated with second hand clothing. *Adv. Consum. Res.* 33, 29–35. Available online at: https://www.acrwebsite.org/volumes/v33/v33_47.pdf

Scammon, D. L. (1977). Information load and consumers. *J. Consum. Res.*4, 148–155. doi: 10.1086/208690

Schmitt, B. (1999). Experiential marketing. *J. Market. Manag.* 15, 53–67. doi: 10.1362/026725799784870496

Schor, J. B. (2005). Sustainable consumption and worktime reduction. *J. Ind. Ecol.* 9, 37–50. doi: 10.1162/1088198054084581

Sheth, J. N., Sethia, N. K., and Srinivas, S. (2011). Mindful consumption: a customer-centric approach to sustainability. *J. Acad. Market. Sci.* 39, 21–39. doi: 10.1007/s11747-010-0216-3

Shin, E., and Lee, J. E. (2021). What makes consumers purchase apparel products through social shopping services that social media fashion influencers have worn? *J. Bus. Res.* 132, 416–428. doi: 10.1016/j.jbusres.2021.04.022

Shove, E. (2010). Beyond the ABC: climate change policy and theories of social change. *Environ. Plan A* 42, 1273–1285. doi: 10.1068/a42282

Shove, E., Pantzar, M., and Watson, M. (2012). *The Dynamics of Social Practice: Everyday Life and How it Changes*. London: SAGE Publications. doi: 10.4135/9781446250655

Shrum, L. J., Lowrey, T. M., Pandelaere, M., Ruvio, A. A., Gentina, E., Furchheim, P., and Steinfield, L. (2014). Materialism: the good, the bad, and the ugly. *J. Marketing Manag.* 30, 1858–1881. doi: 10.1080/0267257X.2014.959985

Sobol, K., and Darke, P. R. (2014). "I'd like to be that attractive, but at least I'm smart": how exposure to ideal advertising models motivates improved decision-making. *J. Consum. Psychol.* 24, 533–540. doi: 10.1016/j.jcps.2014.03.005

Solér, C. (2018). *Stress, Affluence and Sustainable Consumption*, 1st Edn. Routledge. doi: 10.4324/9781315174792

Solér, C., Baeza, J., and Svärd, C. (2015). Construction of silence on issues of sustainability through branding in the fashion market. *J. Market. Manag.* 31, 219–246. doi: 10.1080/0267257X.2014.977331

Steg, L. (2015). "Environmental psychology and sustainable consumption," in *Handbook of Research in Sustainable Consumption*, 70–83. doi: 10.4337/9781783471270.00012

Steg, L., Perlaviciute, G., van der Werff, E., et al. (2014). The significance of hedonic values for environmentally relevant attitudes, preferences, and actions. *Environ. Behav.* 46, 163–192. doi: 10.1177/0013916512454730

Steg, L., and Vlek, C. (2009). Encouraging pro-environmental behavior: an integrative review and research agenda. *J. Environ. Psychol.* 29, 309–317. doi: 10.1016/j.jenvp.2008.10.004

Stern, P. C. (2000). New environmental theories: toward a coherent theory of environmentally significant behavior. *J. Soc. Issues.* 56, 407–424. doi: 10.1111/0022-4537.00175

Stevens, L., Maclaran, P., and Brown, S. (2019). An embodied approach to consumer experiences: the Hollister brandscape. *Eur. J. Market.* 53, 806–828. doi: 10.1108/EJM-09-2017-0558

Tanner, C., and Wölfing Kast, S. (2003). Promoting sustainable consumption: determinants of green purchases by Swiss consumers. *Psychol. Market.* 20, 883–902. doi: 10.1002/mar.10101

Thaler, R. H., and Sunstein, C. R. (2009). *Nudge: Improving Decisions about Health, Wealth, and Happiness*. New York, NY: Penguin.

Thompson, C., and Haytko, D. (1997). Speaking of fashion: consumers' uses of fashion discourses and the appropriation of countervailing cultural meanings. *J. Consum. Res.* 24, 15–42. doi: 10.1086/209491

Tynan, C., and McKechnie, S. (2009). Experience marketing: a review and reassessment. *J. Market. Manag.* 25, 501–517. doi: 10.1362/026725709X461821

Van Rompay, T. J., Tanja-Dijkstra, K., Verhoeven, J. W., and van Es, A. F. (2012). On store design and consumer motivation: spatial control and arousal in the retail context. *Environ. Behav.* 44, 800–820. doi: 10.1177/0013916511407309

Varey, R. J. (2010). Marketing means and ends for a sustainable society: a welfare agenda for transformative change. *J. Macromarket.* 30, 112–126. doi: 10.1177/0276146710361931

Vermeir, I., and Verbeke, W. (2006). Sustainable food consumption: exploring the consumer "attitude—behavioral intention gap. *J. Agric. Environ. Ethics* 19, 169–194. doi: 10.1007/s10806-005-5485-3

Welch, D., and Warde, A. (2015). "Theories of practice and sustainable consumption," in *Handbook of Research on Sustainable Consumption*. Cheltenham: Edward Elgar Publishing. doi: 10.4337/9781783471270.00013

White, K., Habib, R., and Hardisty, D. J. (2019). How to SHIFT consumer behaviors to be more sustainable: a literature review and guiding framework. *J. Market.* 83, 22–49. doi: 10.1177/002224291982564

Wilhite, H. (2012). Towards a better accounting of the roles of body, things and habits in consumption. *Collegium.* 12, 87—99. Available online at: https://helda.helsinki.fi/bitstream/handle/10138/34224/12_05_wilhite.pdf?sequence=1

Woodruffe-Burton, H., and Elliott, R. (2005). "Compensatory consumption and narrative identity theory," in *N— Advances in Consumer Research, Vol 32* (Duluth, MN: Association for Consumer Research), pp. 461–465.

Woodward, I. (2006). Investigating consumption anxiety thesis: aesthetic choice, narrativisation and social performance. *Sociol. Rev.* 54, 263–282. doi: 10.1111/j.1467-954X.2006.00613.x

Yakhlef, A. (2015). Customer experience within retail environments: an embodied, spatial approach. *Market. Theory* 15, 545–564. doi: 10.1177/1470593115569016

Young, W., and Middlemiss, L. (2012). A rethink of how policy and social science approach changing individuals' actions on greenhouse gas emissions. *Energy Policy.* 41, 742–747. doi: 10.1016/j.enpol.2011.11.040

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Virtual consumption: A review of digitalization's "green" credentials

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The unprecedented development, growth, and widespread pervasiveness of digital Information Communication Technologies (ICTs) have coincided with ever-increasing levels of consumption and the climate emergency. Digital ICTs, once lauded for their potential to dematerialize society, are now imposing additional burdens on the planet. The widespread consumption of personal electronics continues to grow at an enormous rate, while recycling of the scarce rare-earth minerals that are crucial to their development is negligible. As digital technologies become ubiquitous, the need for additional energy to power our ever-increasing number of digital devices and services must also keep pace. Moreover, despite their public veneer as progressives, digital tech companies are collaborating with fossil fuel companies to render oil and gas extraction more profitable and with greater speed, fuelling climate breakdown. Online social platforms are also being misused as podiums for dis/misinformation and falsehoods counter to the scientific consensus of anthropogenic climate change, allowing the digital tech sector to abdicate any social responsibility and denying the dire consequences of inaction. This review article explores the growing consumption demands and the ecological threat from digitalization and the digital tech sector: demands that will only intensify with our insatiable appetite for digital tech services and products. Such a review aims to draw closer attention to some ways such technology can be used to assist ecological research and conservation, but also to expand upon our understanding of the negative environmental aspects of a relentless push toward a Digital Society. In uncritically accepting Big Tech's virtuous credentials, we are choosing to ignore the immense power and influence they have over our lives, and the ways they may be propelling our environment toward collapse.

KEYWORDS

digitalization, consumption, climate change, Information Communications Technologies (ICT), Big Tech

Introduction

The development and ubiquitous public acceptance of digital Information Communications Technologies (ICTs) in contemporary society have been an incredible phenomenon, ushering in the Digital Age.[1] Such technologies now play a pivotal role in keeping us all more connected to family and friends, also allowing us to work more efficiently and competently—-at times, performed at a distance from traditional centrally located workplaces—-and in some cases helping to improve our health and overall quality of life. All these features and benefits of digital technology were brought into sharp focus throughout the recent global pandemic. The utility of many aspects of digital ICTs is now widely accepted, and it would be foolhardy to suggest otherwise. There continues to be significant optimism, and myth, around the development, aims, use, and diffusion of digital ICTs and, indeed, hope that such technologies can offer solutions in addressing critical issues related to (over)consumption, conservation, and for developing strategies that can mitigate the risks of further environmental harm (UNFCCC, 2021). However, the impetuous forward momentum of digitalization globally and its impacts on consumption and the climate is a double-edged sword, and the positive effects are not always unequivocal and absolute. With the speed of digital ICT innovation and development came an unconsciousness or blindness to adverse negative aspects of their impacts on society and the environment that have been under-investigated and under-acknowledged (Dwivedi et al., 2022). For example, Junior et al. (2018) suggest that digital tech is one of the least sustainable and most environmentally damaging sectors globally. The pervasive consumption of personal electronics—-in particular lightweight mobile digital devices such as smartphones, laptops, tablets, and wearable digital technologies—-is contributing to mounting environmental concern about the mining of the precious rare-earth materials and minerals needed to power these gadgets and the growing e-Waste that results once such devices are discarded (Ohene Opare and Mirkouei, 2021). Moreover, the obscured energy demands fuelling our voracious appetite for services run on these digital devices are now placing immense pressure on energy supplies, which is powering an even greater intensification in the burning of fossil fuels worldwide. Colossal data centres are now central to the Digital Age and are being built at an extraordinary rate globally to keep up with services demands (Statista, 2022b) leading to growing energy consumption. Digital innovations, such as Blockchain and crypto currencies, are consuming vast quantities of energy in their "mining," all of which, it is argued, remain heavily reliant on the burning of fossil fuel (Gundaboina et al., 2022). Meanwhile, the leading corporations of the digital tech sector are actively assisting and hastening fossil fuel extraction and amplifying climate change denial, contrary to their more enlightened public image and utterances.

There is now an increasing urgency to "shine a light into the darker corners of digitalization" and to highlight the societal, cultural, economic, and environmental challenges that have emerged and that need to be confronted (see Hynes, 2021). This review investigates the realities of our relentless push toward a "Digital Society"[2] in terms of the environment, conservation, and consumption: to highlight some positive ways digitalization is contributing to ecological good, but also draw attention to some growing environmental concerns related to the Digital Age. It is not an attempt to account for all such new digital technologies, innovations, and practices, but instead to consider and discuss the main ecological impacts and effects of digitalization, and how the digital tech sector broadly responds to such challenges. While there are increasing attempts to investigate and report on the economic, social, and political consequences of digitalization (for example: Runciman, 2018; Zuboff, 2019; Zhuravskaya et al., 2020; Fuchs, 2021; Herlo et al., 2021; Susskind, 2022), environmental, ecological and sustainability concerns related to the Digital Age have received less attention. With some exceptions (e.g., Hazas and Nathan, 2018; Efoui-Hess, 2019; McGovern, 2020) there continues to be a deficiency of academic literature on how genuine environmental protection and harm reduction can be incorporated into future digital technology development, innovation, and transformations (Feroz et al., 2021). The rationale for this review, therefore, is an attempt to bridge this gap and provide a broader and more holistic overview of the ways digitalization, and the industry itself, is impacting our environment and whether it should be understood as an environmental good actor or not. In the absence of a deeper understanding of the ways and means digitalization has embedded and normalized itself into our everyday lives, we become blind to the many ways it is affecting our quality of life and furthering climate breakdown.

1 For the purpose of this review, the Digital Age refers to the technologies and networked connectedness that has been made possible by the development and widespread use of microprocessors, memory chips and telecommunication circuits over the recent decades. These developments led to incredible growth in the use of computers in the workplace and in the home, largely beginning in the 1990, heralding what has become known as the Third Industrial Revolution or the Digital Age. This new age is often epitomised by the development and public availability of the World Wide Web in 1991.

2 The concept of the 'Digital Society' is an attempt to understand digital ICTs as having intentional social and political power, to mould a research and development agenda around such technologies, and inform discussions on policy, innovation and likely opportunities into the future. For a good overview of current research in this area, see the Internet Policy Review special section (Katzenbach and Bächle, 2019).

For this review, a broad exploration and examination of the current literature was conducted for several months—-February to June 2022—-in addition to the author's previous research experience and interest in the areas of digital ICTs and their societal and environmental impacts. An initial list of emerging technologies and environmental issues was established through the use of Google search using Google Chrome and the use of keywords: in the case of the positive effects "digital technology environmental good list," and in the case of the negative effects "digital technology environmental harm list." This online search aimed to select studies, research, reports, and articles that would best reflect the current literature and evidence, but some subjectivity must be acknowledged in this desktop online search. A list was drawn up of some key areas and concerns that require closer consideration and examination, a list that suggests some similarities across the various websites. An assessment and analysis of these listed areas and concerns were then undertaken. There was a considerable focus on the most up-to-date research and reports from some leading agencies and organizations tasked with investigating the positive contribution digital ICTs can have, but also the consequences and effects digitalization is having in terms of (over)consumption of resources and energy, and on the environment generally. In addition, there was particular attention given to some leading academics, social and environmental public commentators who are more critical of current digitalization pathways, and an investigation of the public debates and discourses from political arenas. The results were all used to identify, assess and communicate a more complete evaluation of the current state of digital ICTs, in terms of its present and potential future environmental attributes and credentials. It is argued that the narrative of almost unstoppable changes is already underway, driven by a technological determinism that this is affecting our economy, society, and the environment in various ways (Ström, 2019; Vogels et al., 2020; Sareen and Haarstad, 2021). There is danger in failing to recognize and discuss the harmful ecological outcomes of digitalization more destructive technologies and practices, which become societally embedded over time. But, with a clearer understanding of what is happening society can realize different pathways: we can find occasions to intervene, to resist, to organize and legislate, to plan, and to design our shared futures (Mitchell, 1996). Based on this overall review, possible ways to address these concerns will be presented. However, it is important to begin such a review on a positive note and to point to some of the encouraging contributions that digital ICTs have and are having, and potentially can have, on consumption, the environment, conservation efforts, and in alleviating various elements of the climate crisis.

Digitalization's positive contributions

The emergence of the Digital Age must be positioned within the wider context of one of the key challenges facing contemporary society. The evidence of anthropogenic climate change is now undeniable. One of the key conclusions of the most recent Intergovernmental Panel on Climate Change (IPCC) report on the subject is that it is now an "established fact" that humans are disproportionately responsible for the excessive greenhouse gas (GHG) emissions that have led to an intensification of extreme weather and climate events over the recent past (IPCC, 2022). The planet is now facing a three-pronged threat of climate change, pollution and excessive waste, and biodiversity loss, and policies and actions to address these are now time-critical. Well-designed and thoughtful initiatives leveraging the benefits of digital ICTs have the potential to be instrumental in helping positively change patterns of consumption and shape low-carbon pathways and futures, making us less vulnerable to risks (Stančič, 2012). In particular, digital ICTs can help with consumption and climate monitoring, energy efficiency strategies, approaches to mitigation and adaptation, and wildlife and biodiversity conservation efforts. Under the 2030 Development Agenda, the United Nations General Assembly identified the need to recognize and value the role that digital ICTs can play in engaging with its Sustainable Development Goals (SDG), and the opportunities this may present (Wu et al., 2018). This section investigates just a few of these digital ICTs opportunities and approaches that are being used to assist efforts at mitigating some of the worst effects of climate change, aiding conservation efforts, and preserving the biosphere for future generations. These have been selected based on their development and maturity, and their current availability and status as digital technologies applied to alleviate various aspects of environmental and ecological harm.

Monitoring, recording, capturing

The IPCC (2020) classified several recent digital technologies that it states can aid in the transition to net-zero emissions as mature and in the early stages of development and adoption. But some scientists now see the need for a novel new set of digital technologies that will be essential to comprehensively de-fossil fuel our entire energy systems (Minx et al., 2017). This set of new technologies is commonly referred to as "carbon management" and includes carbon capture, utilization, and storage (CCUS) technologies.[3] The term is manifest in the recently retitled Office of Fossil Energy and Carbon Management in the U.S. Department of Energy (Faber et al., 2021). As part of this set of approaches, Digital ICTs provide the unique ability to both effectively and efficiently collect and analyze important carbon emission information that

3 Although originally developed by NASA in the 1970s, such technologies are at varying levels of maturity but can be described as 'new' because of the immense increase in computing power made possible by digitalisation over the past few years.

enables us to better assess society's impacts on the environment. This information allows us to manage energy use and the production of both home and industrial greenhouse gases. Such technologies are used to investigate and manage the local and global environment and come under three general headings of observation, analysis, and the sharing of data. Digital ICTs contribution to carbon management is largely broken into three main categories: emission measuring and reporting, abatement, and carbon offsetting. Measuring encompasses the collection of CO_2 data emissions organized by type and geographical region. Abatement involves identifying the significant emission sources and attempting to apply some reduction measures. Carbon offsetting is considered the option of last resort and is a scheme whereby an organization, city, region, or indeed an individual, attempt to neutralize and compensate for their emissions by investing in other projects or initiatives that reduce or stores carbon. Such offsetting is related to a wide range of environmentally friendly projects such as providing renewable energy sources to protect the rainforests, and the offsetting is dependent on a system of credits that pay for an organization's carbon emissions. Digital technologies help gather data from various sources and metering instruments and allow for more efficient reporting and analyses on such data, and in some instances allow systems to optimize energy use.

Conservation efforts

Digital ICTs hold the potential to help with conservation management efforts and to assist conservationists in better understanding and addressing acute ecological challenges, helping protect biodiversity and endangered species globally, and communicating the damage inflicted upon the biosphere from the worst effects of anthropogenic climate change. A report for *Wildlabs* (Speaker et al., 2021) found that Artificial Intelligence (AI)[4] was one of the leading emerging digital technologies that could considerably aid conservation efforts. Using already established technologies such as satellite imaging, audio recordings, and location-specific camera footage, the report stated that AI could be used to identify rare and endangered species from the thousands of photographs gathered from such technologies or to determine a specific animal class from audio field recordings. Such technologies hold the potential to lessen the laborious manual work required to gather such essential conservation data from large pools of images and audio and to determine a specific fit. Digital ICTs also increasingly influence the ways that the public recognizes, considers, and engages with nature and, in some instances, can be used to re-engage and re-connect young people with their natural environment (Altrudi, 2021). These digital communication mediums have been acclaimed by conservationists because they promise more and faster data processing and actionable information. They promise new and novel communication means, improved information access, and stimulating visual representations: all of which go to make up new powerful decision-making support systems (Arts et al., 2015; van der Wal and Arts, 2015). Other uses of digital ICTs in conservation efforts include the use of "smart" collars to help track and conserve wildlife (Willoughby, 2017), better mapping and visualization through the use of platforms like Google Earth (Beresford et al., 2020), remote mapping and the monitoring of wildlife and biodiversity (Wich and Koh, 2018), the use of genomic approaches to wildlife conservation and management (Hohenlohe et al., 2021), and the use of predictive analytics software in conservation, helping researchers pinpoint where endangered animals are geographically located and their specific movement patterns, and even how they form into their various social groups (IndustryWired, 2022).

Tracking emissions from space

In addition to digital ICTs supporting conservation efforts, a new generation of satellites, powered by digitalization innovation and development and set to launch in 2023, will soon be able to track emissions of the potent climate-warming gas methane and assist in emission reduction goals. The first of these new higher resolution-monitoring satellites will launch next year, delivering data that will provide near-global coverage of plumes of methane emissions directly back to research centers on earth. Speaking to reporters for *The Guardian*, Ilissa Ocko, a climate scientist for the Environmental Defense Fund's (EDF) MethaneSat, suggested that these satellites will provide information on the levels of emissions coming from particular areas of the planet, which then can be aggregated for specific countries so that we are more informed about what actual baseline emissions currently exist (Timperley, 2022). These follow on from previous satellites which sent back images revealing that the bulk of the 1,800 biggest methane sources come from just six major fossil fuel-producing countries: Turkmenistan, the Russian Republic, the United States, Iran, Kazakhstan, and Algeria (Lauvaux et al., 2022). Methane is the second-largest contributor to climate change after CO_2, but until recently had received much less attention. The Intergovernmental Panel on Climate Change reported that anthropogenic methane is responsible for about a quarter of the 1.1^{C} warming that is being witnessed today, and tracking such emissions will have a significant impact on whether the world manages to keep the global temperature rise below 1.5^{C}

4 The term AI is frequently used to describe machines that mimic and display human behaviours and human cognitive abilities and skills. Because of the enormous increase in computing power brought about by digitalisation, AI research and improvements has been able to make great leaps forward in the past two decades and, thus, in this review AI is viewed under the suites of developments made possible by digitalisation.

(IPCC, 2022). Previously, NASA's OCO-2 satellite was launched in 2014 and was developed to observe carbon dioxide levels in the atmosphere (Taylor et al., 2016). The Paris Agreement[5] established a transparency framework for CO_2 emissions, and researchers have now developed a model that can calculate individual countries' emissions from the burning of fossil fuels from observations from space (Kaminski et al., 2022). Such advancements in digital ICTs have enabled new efficiencies, depth, and levels of measurement and analysis of the data returned from these satellites, and such information can assist with averting the most severe impacts of air pollution and climate change, which requires an understanding of the sources of such emissions.

In the home

Home Energy Management Systems (HEMS) provide beneficial feedback on household energy consumption and usage through a host of smart home devices and features. Such systems normally provide a connection to cloud-based data storage, are accessible through a smartphone or digital device app, rely on user intervention to manage energy consumption in response to alerts about usage, generation, and or pricing information, and are designed to better support key decision-making for sustainable household energy consumption (Shaw-Williams, 2020). The necessary usage, generation, and pricing data emanate from the Internet of Things (IoT), a network of linked physical objects, "things," or nodes that are interconnected and that communicate specific data for analyses. These include mobile or fixed digital devices, computers, household appliances and machines, and may even include people or animals that are embedded with electronic sensors or software (Gillis, 2022). Each of these nodes possesses unique identifiers and has the function and ability to transfer data instantaneously across the network with minimal human-to-human or human-to-computer interaction or interventions. In 2019, of the 17% of gross energy consumption across the European Union, household energy consumption accounted for some 26% (Eurostat, 2021). In terms of energy consumption and efficiency, such new digital technologies applied to a variety of smart home devices and appliances have the potential to reduce overall energy demand and introduce efficiencies into the domestic sector (European Commission, 2015). Energy efficiency in homes and other buildings is considered one of the most fundamental objectives for supporting and promoting international energy sustainability, and this challenge has motivated recent research in the design of HEMS based on sensors that analyze how energy is consumed (Moletsane et al., 2018). The term *smart home* refers to HEMS being aware of the state of its devices, which is done through the use of digital ICTs and their connection to the wider internet (Mandula et al., 2015). Smart homes usually comprise smart devices and appliances, smart metering, and home automation, and often entail varying levels of tariffs to the consumer. Smart metering makes it feasible to amass and deliver energy consumption data and information to homeowners and Utility companies in real time, and smart devices and appliances can respond spontaneously to exterior signals optimally with the help of home automation systems (Paetz et al., 2012).

At the micro or grassroots level, individuals can make personal contributions to reducing consumption in a meaningful way through their actions prompted by information and feedback obtained from countless available digital apps. D'Arco and Marino (2022) revealed a positive and substantial link between the awareness of consequences, an acknowledgment of responsibility, individual norms, and environmental citizenship behavior in both the private and public spheres. Their study, however, also suggested that the use of sustainability apps, or eco-apps, had only a moderating effect on the predictors of environmental citizenship behaviors. The consumers' perception and awareness of eco-products have the maximum effect in directing their environmental concerns into purchase intent, or in reducing consumption generally (Hojnik et al., 2019). Additional research established a complex relationship between the individual's earlier environmental understanding and knowledge and the use of green labeling that influence attitudes toward sustainable products (Cerri et al., 2018). Ethical features of the production process were also important forecasters of consumer attitudes toward sustainable or eco products, contrary to previous understanding. Eco-apps that promote resource sharing, recycling, making greener product and fashion choices, helping to fight food waste, and sharing the positive changes individuals are making within like-minded communities, all indicate the utility of using mobile digital services to engage individuals in sustainable consumption practices and in tackling environmental issues (Balińska et al., 2021).

Working from home

Another promising way that digital ICTs can contribute to energy consumption efficiency, which underwent an inevitable and significant rise during the recent pandemic, is the practice of working from home. Working from home (also known as teleworking, telecommuting, or eWork) can potentially lessen, or even eliminate, the obligation to commute by private car daily to and from a person's place of work, and it has been lauded by

5 Adopted by some 196 countries at COP 21 in December 2015 and coming into force on the 4th November 2016, the Paris Agreement is a legally binding treaty that set controls on global emissions for all international signatories. The overall aim of the Paris Agreement is to limit global warming to well below 2 degrees Celsius over the coming years, preferably 1.5 degrees Celsius.

some policy- and decision-makers as a valuable way to decrease the overall "unsustainable consumption of distance" (Hynes, 2013). Drawing on a survey of some 10,000 Americans aged 20–64 years, Barrero et al. (2020) revealed that the pandemic necessitated a significant shift to working from home, reducing commuting time among American workers by more than 60 million h per workday. A systematic review of the energy impacts of teleworking found that 26 out of 39 studies revealed that the shift to teleworking had reduced overall energy use: only eight studies suggest that teleworking increased or had no impact on such consumption (Hook et al., 2020). This review incorporated the energy savings from reduced commuting to and from work, and the indirect impacts associated with changes in home energy consumption and non-work travel. Analyses of commuter trends and labor market data from the International Energy Agency (IEA) during the pandemic established that if every person capable of working from home were to do so for just 1 day a week, it could have a saving of ∼1% of global oil consumption for road transportation per annum (Crow and Millot, 2020). Factoring in the inevitable rise working from home would have in overall household energy consumption, the impact on global CO_2 emissions would see a yearly decline of 24 million tons (Mt), which is equivalent to the majority of Greater London's annual CO_2 emissions. However, it is argued that while working from home may well help to lessen transport-related carbon emissions, the definitive size of such reductions remains highly susceptible to rebound effects[6] (Bachelet et al., 2021).

Matters of growing environmental concern

To avoid the enormous human and social costs that will inevitably arise from unchecked climate change, all sectors of the global economy, including digital ICTs, must endeavor to maintain or reduce their greenhouse gas emissions in line with those levels established in the Paris Agreement. Global digital ICT consumption is largely made up of three significant sectors: end-user equipment and related services, data centers, and networks. In light of the concerted efforts to reduce greenhouse gas emissions after the signing of the Paris Agreement, ICTs have received limited attention and scrutiny as a major contributor to global emissions and are, indeed, often lauded and promoted for assisting efficiencies that reduce other industry sector's carbon footprints (IEA, 2017). However, the growth in digital ICTs has coincided with steady growth in the size of our overall global carbon footprint. Several studies before 2015 showed consistent increases in the carbon footprint of digital ICTs and, even without considering the full life cycle emissions, the trend line showed a 40% increase from 2002 to 2012 (Ritchie et al., 2020). But digital ICTs and the Big Tech sector could be responsible for an even greater portion of worldwide emissions than previously stated, and these will continue to increase considerably unless action is taken, a new study highlighted (Freitag et al., 2021). This study examined peer-reviewed estimates of digital ICT emissions, which put the industry's share at 1.8–2.8% of overall levels. It revealed marked differences in emissions and arguments about the underlying assumptions behind the peer-reviewed studies, deliberations that may well suggest that global emissions from the digital tech sector are even higher than stated. All the analysts agreed that digital ICT emissions will not decrease without major collaborative industry and political attention and responsiveness, and they provided reasons for anticipating that emissions from the sector will increase over time without real and concerted action. The energy footprint of ICTs is still growing due to broader demands in a range of economic sectors (Makonin et al., 2022), even as the energy consumption of individual devices is reducing. Large installations of digital ICTs for the implementation of energy Smart Grids and e-services will further increase emissions. Belkhir and Elmeligi (2018) suggest that, without immediate action, digital ICT emissions could well increase from about 1% to 1.6% in 2007 to surpass 14% of the 2016-level global greenhouse gas emissions by the year 2040. This would account for more than half of the current comparative emissions from the transportation sector. Freitag et al. (2021) argue that while the tech sector offers ways and opportunities to assist greenhouse gas emission reduction in other sectors, the evidence does not support their ability to achieve the prolonged major carbon savings in their industry that is required by 2050. This particular section of the review will look more closely at some of the more prominent areas, as revealed in the online search, in which the growth in digital ICTs continues to accelerate unsustainable energy and resource consumption leading to continuing climate breakdown and some significant social costs.

The relentless consumption of electronic devices

The emergence of the Digital Age has coincided with an enormous upsurge in the consumption of small, portable digital electronic devices and gadgets. The consumer electronics market was valued at over US$ 1.7 trillion in 2016 and is expected to surpass US$ 3.8 trillion by 2024 (Coherent Market Insight, 2022). Products traditionally categorized as consumer electronics are devices such as tablets, smartphones, laptops, computers, game consoles, digital televisions and

6 Also known as the Jevons Paradox, the rebound effect proposes that the more efficient technologies become the greater use of a resource. This, over time, tends to reduce or eliminate such efficiency gains. It is a term named after William Stanley Jevons who, in his book the Coal Question, wrote about such anomalies in the coal industry at the end of the 19th century.

cameras, wearable technologies such as watches, and other home or smart home devices and products. The Covid-19 pandemic and resulting measures implemented across societies to restrict the spread of the virus ignited a substantial and sustained surge in sales in many segments of the consumer electronics market throughout 2020 and 2021 (Upadhyay and Watkins, 2021; Stewart and Crossan, 2022). These increases in sales were mainly driven by the absence of out-of-home entertainment opportunities and the pivot to working and studying from home for many individuals and families. Digital Consumer Innovation (DCI) designates consumers purchasing and acquiring digital products or services in the fields of food, transport, household goods, and energy, which influence a person's consumption habits or lifestyle and, thus, transform conventional consumption patterns (Lyons et al., 2018). Such change can be complex and diverse, given such a sociotechnical system, so the benefits in terms of carbon emission savings brought about by DCI can be erratic and ambiguous. People from different socio-economic backgrounds with mixed understandings, acquisition abilities, and usage needs, also differ in their approaches, a construct termed "digital inequality" (Zilian and Zilian, 2020). But many people across the globe are now connected through the use of mobile digital communication technologies and devices, although again not always equally (Silver, 2019). Most of a smartphone's energy cost comes from the production process. In terms of energy use, building a smartphone accounts for nearly 85–95% of its annual carbon footprint because engineering its electronics and mining for the rare-earth minerals and metals that go into their assembly is energy-intensive (Patel, 2018). Analysis has shown that smartphone emissions grew from 17 to 125 megatons of carbon dioxide equivalent between 2010 and 2020—-an increase from 4 to 11% of overall digital ICT emissions—-and this is largely driven by the 1.5–2.5 years that a smartphone is used on average (Pasternack, 2020). Very few of these personal digital communication devices are recycled (Statista, 2021), an issue that will now be looked at in more detail shortly. However, before discussing the issues of recycling and e-waste, the mining of rare-earth minerals and metals to fuel the extraordinary consumption of mobile digital ICT devices needs closer attention.

Mining for precious metals to power our devices

Smartphones, and other high-technology digital ICT devices, are manufactured using mineral commodities, more than half of which are mined and semi-processed materials from various regions of the world. This is leading to a booming international mining industry and trade specifically targeted at mining for rare-earth minerals and metals that go into the manufacture of our digital devices.[7] Mining for such rare-earth components remains extremely problematic and damaging to local mining communities. In addition to contaminating the air, the process also damages ecosystems and generates "tailing," which is the toxic and unwanted by-products that seep into the soil and water sources during the mining process. These rejected minerals and rocks release toxic metals such as arsenic and mercury which damage aquatic wildlife that rely on a clear clean water supply (Tayebi-Khorami et al., 2019). Moreover, while some of these minerals and metals can be found and mined safely and ethically in developed countries, most are located in countries fraught with conflict and secrecy and often mined in environmentally damaging ways. For example, smartphones predominantly run on lithium-ion batteries. This material is extracted from salt lakes, a significant potion that comes from the so-called "lithium triangle" that includes countries in South America such as Chile, Bolivia, and Argentina (Ahmad, 2020). In these regions, mining companies negotiate with the indigenous communities who inhabit these areas. Heredia et al. (2020) reported that these communities agree that mining, and its associated activities, done without considering sustainable development approaches, damage their natural local ecosystems and the special relationship they have with their lands. Specifically, the amount of water utilized by lithium mining projects was of particular concern to indigenous representatives: both the extraction of brine and the water needed to process the brine.

Rare-earth deposits can be found on all continents of the planet. However, China produces more than 90% of all globally used rare-earth materials, which has led other regions and countries, such as Europe, America, Australia, and Japan, to express growing concern about the supply chain of such materials, and the world's collective and mounting dependence on China for such resources (Jaroni et al., 2019). About half of that output is from the city of Baotou alone, and most of the rare-earths processed are extracted in Bayan Obo, a mining district some 120 km north of the city in the Gobi Desert. A report in *The Guardian* revealed that ore is often contaminated with radioactive materials such as thorium, and the separation process requires huge amounts of carcinogenic toxins such as sulfates, ammonia, and hydrochloric acid (Kaiman, 2014). Almost 2,000 ton of toxic waste is produced in processing just one ton of rare-earths, and Baotou's operations generate nearly 10 million tons of wastewater per year, much of which is thrust into tailing dams like the one 12 km west of the city at Wang's village. Zhang et al. (2022) suggested that the environmental costs of rare-earth exports are greater than the economic benefits that accrue. Foreign consumption contributes more than half of the associated environmental costs, with rare-earths

7 For more information about the minerals and metals that are assembled and used to make smartphones, see https://pubs.usgs.gov/gip/0167/gip167.pdf.

accounting for nearly 60% of the external consumption-induced environmental costs. This essentially means a convenient transfer of the negative impacts and costs of mining such materials from overseas countries back to mainland China. Illegal mining and processing of such materials inside China and their smuggling out of the country are damaging the Chinese mining industry while only the downstream industries are profitable, at the expense of the localized environment (Packey and Kingsnorth, 2016). This legacy of environmental damage, due to mining and processing activities, has raised social concerns and the pollution problem due to lax legislation that is now costing China billions of dollars to correct (Barakos et al., 2018). Further mining intensification threats are on the horizon. Electric vehicles are now strongly positioned and politically supported as green technologies to reduce CO_2 emissions and help abate some of the challenges of climate change emanating from the transport sector. But their effective market dissemination will greatly increase demand for specific metals such as lithium and cobalt for car batteries, as well as for other rare-earth minerals and metals for the magnets used in electric motors (Langkau and Erdmann, 2021).

Cobalt is a crucial mineral in lithium-ion batteries used in the development of smartphones, and the majority of the international reserve of cobalt originates from the Democratic Republic of Congo in Central Africa. More than 70% of the world's cobalt comes from the Democratic Republic of the Congo, 15–30% of which is produced by artisanal and small-scale mining (Baumann-Pauly, 2020). Consequently, there are some significant ethical issues in cobalt mining, including concerns about child labor and environmental and ecological damage. The region is further beset by widespread corruption and conflict. Significant problems and concerns have been documented by human rights organizations over the recent past, and these human rights threats were especially high in artisanal mining operations. Amnesty International issued two reports in 2016 and 2017 that highlighted mining conditions in the region, and these reports exposed companies that were sourcing materials from artisanal mines that were enabling and protecting child labor and other harmful business practices in their supply chain (Amnesty International, 2016, 2017). Researchers at KU Leuven (Belgium) and the University of Lubumbashi reported that cobalt mining takes a severe toll on the environment and the individual *creuseurs*[8] that work in the mines (Banza Lubaba Nkulu et al., 2018). The study revealed much higher levels of cobalt in the urine and blood of people living in these artisanal cobalt mine communities than people living in an adjacent control area. They found that industrial mining and metal processing at this level and scale has led to significant pollution and ecological damage in the region, and they produced empirical evidence that the artisanal extraction of cobalt that exists in the Democratic Republic of the Congo was causing general toxic harm to exposed peoples and communities.

Recycling and e-waste

The enormous consumption and rapid obsolescence of digital electronics and devices have not only led to growing concerns about resource consumption and depletion but also end-of-life electronic waste, or e-waste, management (Hussain, 2021). An extensive array of goods can be classified as electrical and electronic equipment. Digital ICTs equipment such as personal computers and associated peripherals, game consoles, mobile and smartphones, and other common electronic devices such as video and audio equipment, personal tablets, portable digital assistants (PDAs), MP3 players, and electrical tools, all fall under such category. In addition, numerous everyday items that could previously be considered electrical goods, such as washing machines and dryers, refrigerators, and dishwashers, are now described as "electronic" items because of the installed programmable microprocessors that help run such appliances. Beginning in the late 1980's, hazardous waste has been frequently transported to less developed nations and regions of the world (Akpan and Inyang, 2017). With the advent of computing and the emergence of the Digital Age, such hazardous waste often included e-waste. But growing opposition to such practices led to more stringent laws in developed countries, leading to an escalation in the costs of such waste management (UNEP, 2010). A succession of policies, regulations, and guidelines have since been developed and implemented at the regional, national, and global levels to stimulate and support reuse and recycling, as well as efforts at reducing the toxic raw materials that emanate from such hazardous waste. Despite such oversight and regulation, however, e-waste remains ineptly managed as demonstrated by the small numbers of regulated recycling centers internationally, the continuing illegal shipments of such waste to less developed countries, and evidential human health issues and ecological damage that still occurs (Bakhiyi et al., 2018). The *2020 Global E-Waste Monitor Report* (Forti et al., 2020) revealed that, in the year 2019, the total weight of e-waste was around 53.6 million metric tons of which only a mere 17.4% were appropriately collected and recycled: the remaining 82.6% were not accounted for. The report predictions for global e-waste projects are to climb to 74.7 million metric tons by the year 2030 and digital ICT devices and products contribute significantly to these global streams of hazardous e-waste. Much of this waste is still destined for under-developed nations and regions that lack the statutes, and policies, have social, economic, and cultural barriers, lack the technology and the appropriate treatment facilities to deal with such materials, and are effectively the dumping ground for such waste (Gollakota et al., 2020).

8 The French word creuseur means to dig, to dig a hole in, to hollow out, or to go in deeply. Creuseurs are the ' artisanal diggers' who work in the cobalt mines, often by hand and in poor conditions.

According to the World Economic Forum, only around 20% of e-waste is recycled globally (WEF, 2019): even though a host of complex components and materials such as iron, gold, and aluminum are discovered in such waste (Hsu et al., 2021). Although many arrangements have been developed and employed globally to manage e-waste correctly, most end up in landfill facilitates, incinerated, shipped to the less developed regions of the world, or managed and processed by the informal waste sector (Ilankoon et al., 2018). The informal management of e-waste has led to, in some cases, unlawful shipments of such waste and the exploitation of developing countries that do not have adequate rigorous safety and environmental regulations in place. Conversely, this informal waste sector has also provided some necessary income and employment for people and communities in less developed regions. Nevertheless, these workers, nearby populations, and especially children living in or near such informal e-waste facilities, are being regularly exposed to unsafe and dangerous elements and compounds that can affect cognitive function and intensify the risk of numerous diseases such as respiratory problems and cancers (Lebbie et al., 2021). Discarded and unwanted mobile and smartphones are currently one of the fastest-growing global waste streams and, although the potential for recycling such devices is well-developed and known, present recycling rates remain low (Gu et al., 2019). A worldwide accumulation of rejected but not yet redundant smartphones is highlighted in an index of some 25 countries, which analyses existing reuse and recycling levels (rebuy, 2021). This data indicated that some nations have more redundant or discarded phones hoarded in homes than they have people living in the country. It must also be stated that suppliers and providers of digital mobile devices, like smartphones, strongly influence whether such devices can be repaired and how long they last through their design processes and their business models and offers. Customer behavior is, therefore, directed and controlled by the business models of companies providing such devices and services. This makes corporate players key drivers of e-waste production and the resulting low recycling rates (Suckling and Lee, 2015). Cheng et al. (2020) found that subjective norms, attitude, and perceived behavior control positively influence a person's intention to recycle a mobile phone, and exhibiting environmental concerns will foster their environmentally responsible behavior, which further reinforces their recycling behavior. The recycling of e-waste in general needs to be intensified because mining the planet for scarce minerals and rare-earth metals to make new smartphones, devices and gadgets is unsustainable, according to scientists from the Royal Society of Chemistry (RSC, 2022). They estimated that, in 2021 alone, the world's mountain of discarded electronics weighed nearly 57 million tons, more than the Great Wall of China. They suggest a global effort to mine existing waste facilities for discarded materials rather than mining the earth for original deposits.

Data centres

Data is critical to providing the products and services of the Digital Age, leading to the growth in the storage of large amounts of consumer, personal and organizational data. Social media platforms, music and video streaming, big data, AI, crypto currencies, and the digitalization of many business and production flows are all leading to more and more data being stored and processed in giant data centres. There are burgeoning numbers of data centres being built across the globe to hold these vast stores of data, inevitably increasing energy consumption and demands. The greatest share of direct energy usage in such facilitates is taken by servers and cooling systems, with additional demand stemming from storage drives and network devices. It is estimated that 0.3% of global carbon emissions currently come from the data centre sector, but that a significant upward trend will continue over the foreseeable future (Jones, 2018). In the absence of increases in efficiency, almost 20% of all electricity will be needed to power the digital ICT sector—-accounting for up to 5.5% of the world's carbon emissions by 2025—-which is more than any country except the US, China, and India (Andrae, 2017). A review of various studies on the energy consumption of data centres found greater or smaller increases but, notwithstanding this uncertainty and variation, a further significant increase in the energy consumption of data centres seems likely (Hintemann and Hinterholzer, 2019).[9] The industry is responding: although the levels of computing in data centres more than quintupled between 2010 and 2018, the amount of energy consumed grew only six percent during that period due largely to improvements in energy efficiency (Masanet et al., 2020).[10] However, despite pledges made by both Google and Facebook to achieve carbon neutrality in their new generation hyperscale data centres, technological and policy instruments for decreasing or neutralizing carbon emissions in the sector have not been fully and systematically examined (Cao et al., 2022).

Although data centres are found in most regions of the world, new hyperscale data centres are impacting greatly on local power grids and can require upwards of 100–150 MW and

9 Expects differ on the energy consumption and demands because there are no official figures for data centres and many operators are reluctant to provide such information, quoting concerns over competition and security. Researchers, therefore, must estimate the real energy consumption levels by looking at sales figures for servers or estimates from surveys (Jungblut, 2019).

10 The first generation data centres, which were often inefficient and were operated by banks and others in the financial sector, are now being replaced by newer larger centres and facilities built and managed by the digital tech sector's leading corporations such as Google, Microsoft and Amazon. This may account for the slow rate of growth in energy consumption in the data centre industry.

consume hundreds of GWh of electricity on an annual basis (Kamiya and Kvarnström, 2019). In small countries like Ireland with a growing data centre market, they are quickly becoming a major source of energy demand. Electricity consumed by data centres in Ireland jumped by 144% between 2015 and 2020, according to figures supplied by the country's Central Statistics Office (CSO, 2022). Over the same period, the percentage of electricity consumed by these centres rose from 5 to 11% of overall usage, and these centres are expected to account for 27% of all electricity demand in the country by 2028. There are now 71 operational data centres on the island of Ireland, most concentrated around the Dublin region (Datacenters, 2022), with several others in the planning stage. The Oireachtas Climate Committee[11] heard that the capital city of Dublin alone has become the largest data centre hub in Europe, accounting for nearly a quarter of the overall European industry market share by the end of 2018 (O'Regan, 2021). Ireland, however, is now facing a serious challenge with the security of its energy supply, in part because of this increased energy consumption from data centres. The recent war in Ukraine and the resultant worldwide energy crisis will most likely bring such consumption into sharper focus and attention during the colder winter months ahead.

What is driving data centre growth?

Demand for data centre services is driven by the increasing volume of internet users worldwide, while new technology, practices, and information services hasten this demand. Making calls from our devices and sending and receiving short messages do not represent the greatest part of our carbon footprint, but the energy needed to sustain our growing demands to remain constantly connected does add up. Regular calls and messaging through mobile data generate about 70 kg of CO_2, while as much as 0.3 g of CO_2 per spam email and 50 g of CO_2 per email with an attachment are common (Berners-Lee, 2020). According to Statista (2022a), spam accounted for over 45% of all e-mails sent in December 2021. Watching about half an hour of Netflix generates 1.6 kg of CO_2, the equivalent of driving 4 miles. Overall, Netflix streaming services consume ~370 Terawatt hours (TWh) per annum, which is 1.8 times larger than the collective figure for data centres globally, at present (Kamiya, 2020b). According to *The Shift Project*, 80% of the combined data flows through the internet takes the form of moving images, and the average CO_2 emissions of streaming online video are more than 300 million tons per year, based on 2018 measurements (Ferreboeuf et al., 2019). Music streaming is also a significant contributor with emissions from the recorded music industry in America to be estimated at between 200 million kg to over 350 million kg in 2016, double that of the 157 million kilograms emitted in the manufacture and production of CDs (Brennan and Archibald, 2019). There are debates over exact numbers (Kamiya, 2020a) but the concrete figure for such emissions is challenging to establish because these depend heavily on the type of output device, the network connection and the resolution, and the fact that impacts are distributed across many different sources and regions.

There are currently upwards of 2,500 different crypto currencies being traded on the exchange market resulting in an ever-increasing carbon footprint as such consumption is needed in the mining process, storage, and transaction validation by their various networks (Huynh et al., 2022). Most crypto currencies consume large amounts of energy in their creation or mining, the best example of which is Bitcoin.[12] Cambridge University's Bitcoin electricity consumption index claims that internationally Bitcoin mining alone consumes 130.27 TWh of electricity per annum (CCAF, 2022): a level of consumption that is above countries like Argentina (124 TWh), Norway (123 TWh) and the Netherlands (111 TWh) (The Enerdata Yearbook, 2021). Most academic studies have focused almost exclusively on Bitcoin and principally on externalities resulting from the energy consumption during the mining process, but understudied crypto currencies add almost 50% on top of Bitcoin's energy consumption, which is leading to calls for a more holistic understanding of the environmental impacts of crypto currencies and Blockchain applications in general (Gallersdörfer et al., 2020). Worryingly, Mora et al. (2018) suggest that global temperature could increase by 20c by 2034 if nothing changes in the way technology are used in the creation and storage of crypto currencies. Digitalization's growing appetite for energy will further be driven by the growth in smart technologies, such as those in the home, in industry, and in our increasingly digitalized cities and towns.

More disturbing conduct and concerns

What is the digital tech sector doing to negate the increases in energy consumption brought about by the relentless push toward a Digital Society, and is it living up to its image as a progressive and enlightened industry of the 21st century? While the sector's rhetoric professes to believe in and promote the scientific consensus of climate change, their actions belie a

11 The Oireachtas is the bicameral parliament of Ireland and an Oireachtas committee is a group of members of the Oireachtas chosen by one or both Houses to consider a certain subject, in this particular case climate change.

12 Cryptocurrencies such as Bitcoin are generated or mined by high-end computing power brought to bear to decipher complicated mathematical equations and puzzles. Individuals are rewarded largely based on the amount of computing power they use in solving these problems and the entire process is highly energy intensive.

more troubling position. There is growing evidence that most of the major players in the digital tech sector are tendering their extensive digital ICT experience and knowledge to assist the fossil fuel industry extract oil and gas at much greater rates and with increased efficiency and haste than was possible in the past. A Greenpeace report, *Oil in the Cloud: How Tech Companies are Helping Big Oil Profit from Climate Destruction*, detailed how the digital tech industry was facilitating oil companies to uncover, extract, refine, and distribute oil and gas at a greater pace than heretofore (Donaghy et al., 2019). Amazon,[13] Google,[14] and Microsoft[15] had all undermined their climate pledges and commitments by signing lucrative contracts for their cloud computing services and other AI technologies with oil and gas companies. The carbon emissions from these very profitable agreements are often not stated in the tech companies' carbon reporting, thus concealing the impacts they are having on the changing climate (Stackl, 2020). As these international fossil fuel companies secretively plan large numbers of "carbon bomb" oil and gas projects that would push the climate past globally agreed on temperature limits,[16] the tech sector may well be key to the success of their ambition to supercharge the climate crisis. But, it is more than Big Tech's support for faster fossil fuel extraction: they are also using their immense financial muscle, power, and political weight in ways that undermine the seriousness of the climate emergency. The tech giants Alphabet (Google's parent company), Apple, Facebook, Amazon, and Microsoft spent ~$65 m in lobbying in 2020, yet only about 6% of their lobbying activities were related to climate policy and environmental protection. This is according to an analysis that tracked companies' self-reported lobbying on federal legislation (InfluenceMap, 2021) which reveals that despite vigorous climate statements and commitments from the tech sector, they are not purposefully using their substantial financial resources and influence over governments and regional policies in support of necessary climate action.

Meanwhile, many of the mainstream social media platforms are being used by the fossil fuel industry and malevolently by nefarious individuals and organizations to undermine the scientific consensus of climate change. A recent report written jointly by Friends of the Earth, Avaaz, and Greenpeace (2022) claims that for many decades now, the fossil fuel industry has spent millions of dollars on spreading climate dis/misinformation[17] on and offline to push public polarization, and slow and stop the action to tackle the climate crisis. The report states that previous research has shown that much of the climate dis/misinformation on social media platforms is spread by just a few actors, frequently with vested political and economic affiliations and interests. Such dis/misinformation is then amplified and extended by social media recommendation algorithms, which are specifically designed to maximize human attention and corporate revenue. Decades of such dis/misinformation on fossil fuels' impacts on the climate has halted real and genuine progress on U.S. climate action and policy, for example (Pierre and Neuman, 2021). It is also now widely recognized and accepted that social media platforms have made the circulation of dis/misinformation both simpler and quicker leading to increased climate change litigation (Setzer and Higham, 2021), and many find it difficult to distinguish outright lies from fact (Urakami et al., 2022). According to a recent report from the campaign group Avaaz, YouTube, which is part of the Alphabet suit of companies, has been "actively promoting" videos containing dis/misinformation about climate change: this is despite new policy changes at the company anticipated to shift users away from toxic content, material and conspiracy theories (Avaaz, 2020). The report found that advertisements for some of the world's most trusted brands—-including household names like Warner Bros, L'Oréal, Samsung, Decathlon, Danone, and Carrefourwere—-were found on climate dis/misinformation videos, and that about one in five ads were actually from ethical brands or green organizations including WWF, Greenpeace, and Save the Children.

The spread of dis/misinformation is interwoven with numerous on and offline social processes, one of which is

13 Amazon has become a significant player in the oil industry marketing its established and extensive cloud services to oil and gas companies, which allows these companies enhance and optimise fossil fuel extraction and production, and improve overall profitability (see https://oilprice.com/Energy/Energy-General/Why-Amazon-Is-Suddenly-Courting-Big-Oil.html).

14 It was reported that in 2018 Google started an oil, gas, and energy division (see https://gizmodo.com/how-google-microsoft-and-big-tech-are-automating-the-1832790799), although after the release of the Greenpeace Reports it pledged to stop building customised AI tools that assist oil and gas companies (see https://www.cnbc.com/2020/05/20/google-ai-greenpeace-oil-gas.html).

15 Petrobras and Shell recently announced collaboration with Microsoft (see https://www.energyvoice.com/coronavirus/260017/brazil-petrobras-microsoft/).

16 A recent *Guardian* investigation identified that the world's largest fossil fuel companies have planned some 195 'carbon bomb' projects that have the potential to each emit almost 1 billion tonnes of CO^2 into the atmosphere. It revealed that some 60% of such projects are already under way, which has significant consequences for limiting global emissions to 1.5 degrees Celsius. The investigation contended that, only just a few months after the Cop26 climate summit in Glasgow, countries such as America, Canada and Australia were among those with the most damaging oil and gas projects in development (Carrington and Taylor, 2022).

17 The terms *misinformation* and *disinformation* are often used interchangeably but the critical distinction between these confusable words is intent. Misinformation is false or misleading information that is spread, regardless of intent to deceive, while disinformation is meaningfully spreading misinformation.

"homophily" (McPherson et al., 2001). This is the inclination for individuals to configure social contacts with those who are similar and have similar interests to themselves, encapsulated by the general maxim "birds of a feather flock together." Strong homophily sentiments are manifest in polarized sets of social media users on opposite sides of the climate debate (Williams et al., 2015) and such actions are incited by social media platforms in the way new contacts and networks are both recommended, reinforced, and cemented. Taken with social conventions and the belief that individuals often trust information from people in their social network, this leads to "echo chambers" (Cinelli et al., 2021), where facts and dis/misinformation reverberate around a specific group. This can lead to further division and polarization where communities coalesce around deeply opposing opinions and views on an issue such as the climate crisis. Researchers found evidence that climate denial in political rhetoric has shifted and there is an uptick in dis/misinformation about climate change solutions, which is shaping public attitude about the nature of climate change and the efficacy of real answers and action (McCright et al., 2016). More troubling is how Big Tech is driving engagement with their platforms and, thus, continuing to automate the collection of vast amounts of discrete user information that is the basis of their "surveillance capitalism" economic strategy.[18] Put simply, these platforms make money from the length of user engagement time. Speaking to Johann (Hari, 2022) for his book *Stolen Focus*, YouTube algorithm designer and engineer Guillaume Chaslot explains that they have long figured out that videos that shock or offend hold the viewers' attention for longer. Therefore, their recommendation algorithm is designed not to give the viewer factual information but to offend, annoy and disturb. They leverage emotions such as anger and offense, which can lead to the elevation of contrarian and anti-science material over fact: and this operational approach and arrangement remains largely unchallenged and ably aided by the platform's digital algorithms. Findings from a recent study of Twitter, for instance, suggest a substantial impact of mechanized bots[19] in amplifying denialism messages about climate change (Marlow et al., 2020).

Discussion

This discussion section draws together some of the evidence of digitalization's "green" credentials to offer a more holistic narrative of where and how digital ICT is contributing to improved ecology and conservation, and summons closer attention to some of the areas of growing concern where such technology is contributing to increasing planetary harm. While it must be acknowledged that we are still in the early chapters of the Digital Age, the evidence from this review would suggest that in much of the literature on the contribution of digital ICTs to tackling the climate emergency and issues such as (over)consumption, words like "potential," "possibility," and "can" figure prominently.[20] This review also found that much of the potential at present is in the areas of more effective and efficient data capture, monitoring, and assessment of the harm currently underway, the communication of such harm and approaches for better resource management, attempts at behavioral change through information provision and allowing like-minded activists and groups to organize *via* online platforms. However, decisive action based on such data is far less established and apparent and there is a lack of urgency by many governments across the world to act on such data and evidence, as demonstrated in the finding from the 2021 Lancet Countdown (Romanello et al., 2021).[21] The provision of climate change information alone has ostensibly failed to bring about the necessary mitigation efforts appropriate to the degree and urgency of the climate emergency, suggesting that the "information deficit model" is inadequate (Knutti, 2019).[22] The scientific consensus on the causes and drivers of climate change is settled, not least our consumer-dependent lifestyles, so other barriers and pressures must be at play. There continues to be an absence of genuine political will and determination and a reluctance to act decisively (Leiserowitz, 2019), which is reinforced by the path dependency of fossil-fuel-based systems—-social, political, and economic—-ably assisted by Big Tech. Decisive action is frequently hampered by persuasive but misleading counterarguments amplified over online social

18 For an in-depth understanding of how surveillance capitalism works read Shoshana Zubboff's very insightful 2019 book of the same title.

19 A bot, which is shorthand for robot, is a computer program that functions as a proxy for an actual user or other programs. Its purpose is to simulate a human activity and such bots are generally used to automate certain tasks or activities on the internet. This effectively means they can run without any explicit instructions from individuals.

20 For example, a recent report for The Royal Society (2020) contained chapter and sub headings such as '[t]ransforming the future, [t]he potential of digital technology to support a low-carbon economy, [a] future digitally-enabled net zero economy and society. This all points to potential and possibilities but little evidences of digitalisations real impacts.

21 The Lancet report concluded that there has been 'little progress to protect its population from the simultaneously aggravated health impacts of climate change' and that 'as the world approaches COP26, the response to climate change, and commensurate investment, remains inadequate' (pp. 1653–1654).

22 The deficit model espouses a position that there are gaps between the public and the scientific community because of a deficiency or absence of specific information or knowledge. To rectify and close this gap, the deficit model is a broadcast communication strategy that permits information to flow from experts to the public in attempts to influence and change people's attitudes, beliefs, and or behaviours (Suldovsky, 2017).

media platforms. Indeed, using the tools powering the Digital Age, the fossil fuel industry is continuing its 40-year strategy to manufacture uncertainty and doubt about climate change: disparaging climate scientists, exploiting regulatory capture to its own ends, expunging the scientific record, using propaganda in and outside the classroom, and tricking the public into voting against renewable energy legislation (Bush, 2020). Furthermore, when it comes to consumption, the promise from digital ICT of dematerialization[23] has yet to be realized and, in some instances such as books and music, we are witnessing the beginning of a reversal of such a trend.[24]

Considering smart homes powered by digital ICTs, a Swedish study advocated that effects on energy consumption levels differ significantly across particular households, suggesting that households respond to energy feedback in a bespoke manner (Nilsson et al., 2018). Although smart meters in the home can lead to increased attentiveness to levels of energy consumption as well as improved home comfort, the study indicated that the potential for energy savings from such home systems is largely dependent on peoples' inclination and their ability to engage with the relevant information and features that are provided. The expectations that digitalizing home devices and gadgets alone will lead to a reduction in energy consumption have not yet been fully justified, it is argued, and instead of saving energy in some cases, digitalization has created supplementary energy consumption (Lange et al., 2020). This accumulative energy consumption may well persist, as energy-cutting effects often tend to induce new pathways that lead to energy-increasing outcomes. Moreover, while innovations like the IoT can potentially offer some energy-saving initiatives and consumption decrease, the question of the use of the collected data looms large. Many of these devices collect extraordinary amounts of personal and private data and, as Zuboff (2019, p. 153) argues: each new level of innovation builds on the previous one, and they are all united in one goal, the extraction of behavioral surplus at scale. The question of who collects this data, owns it, uses it, and for what purpose, is of extreme importance if the public is to have any level of confidence in such technologies. At present, the answers to these questions are clouded in secrecy and robustly guarded by the digital tech industry. The IoT will be accompanied, therefore, by a loss of privacy and the collection of enormous amounts of personal data, which opens the door to a much greater barrage of marketing and personally targeted advertising that will intensify unnecessary and needless patterns of consumption. Research on leveraging and capitalizing on the use of IoT data in advertising is already underway (e.g., Wei, 2022; Gai, 2022). But the evidence collected from the academic literature, from expert interviews and location visits suggests that, among other things, HEMS throws up a host of privacy and security issues, reliability concerns, forced lifestyle changes, the transparency and openness of the markets for such technology, the energy rebounds, and wasteful consumption, and the digital divide (Sovacool and Del Rio, 2020).

Using digital ICT personal devices, consumers are increasingly offered more information on the environmental impacts of the products they buy, as well as ways of reducing or changing their patterns of consumption to make them more sustainable. But research has shown that consumers often suffer from knowledge-action or intention-behavior gaps (Liobikiene et al., 2016). This means that, even when consumers intend to shop in more sustainable ways and are provided with the necessary information to do so, it does not inevitably translate into positive action. Indeed, further knowledge denotes a source of quandary, pressure, and paralysis leading to a 'self-inflicted sustainable consumption paradox' in individuals' efforts to lead more sustainable consumption lifestyles (Longo et al., 2019). The increase in public awareness of environmental issues, often brought about by digital ICTs, and the acceptance of the need for pro-environmental attitudes and actions, has not been followed by any substantive changes in behaviors for the vast majority of individuals, it is argued (Burgess et al., 2003). It is also reasonable to suggest that, for example, as individuals opt to work more from home, emissions related to the daily commute to a central work location and energy consumption in the workplace may well decline, but energy consumption associated with the home would correspondingly rise over time. The exact position is more nuanced. A UK study found that teleworkers travel farther each week than non-teleworkers, despite taking fewer trips (Caldarola and Sorrell, 2022). Findings from one recent study attempting to learn lessons from the pandemic reveal that there is not likely to be any reduction in emissions overall and the net result may be a small increase (Santos and Azhari, 2022). A recent Canadian study suggested that if workers continued to operate from home and maintained their existing energy consumption arrangements—-or even close to those levels—-this could lead to an escalation in energy consumption and amplified peak loads, and it would be challenging and financially costly for electricity suppliers to exactly match various supply and demand loads during the day (Villeneuve et al., 2021).

While there is potential for digital ICTs to have positive effects on consumption reduction and climate change, the growing demands from digitalization in terms of device and

23 The concept of dematerialisation is about the absolute or relative reduction in the quantity of materials needed to produce an item or product. It is a phenomenon that has emerged in tandem with digital ICT development and is most associated with the notion of the "paperless office."

24 Despite a significant increase in e-commence during the Covid-19 pandemic, the sales of books increased (Whiting, 2021) while Statista report the ongoing fall of e-reader sales for the period 2018–2025 (Haines, 2021). The sale of vinyl records have also indicated a remarkable resurgence in physical music sales (Gayle, 2021).

energy needs are more worrying. For digital ICT devices, there are complicated ethical problems that require deep reflection and consideration of who benefits from rare-earth element mining activities, who suffer its negative effects, and to what extent new mining ventures are even necessary. The environmental and social impacts in communities where such mining activity occurs may not be worth it and, paradoxically, in attempting to resolve some environmental problems through electric battery development companies are using approaches that only increase environmental damage and harm elsewhere. Electric Vehicles (EVs), in particular, are increasing demand for both Cobalt and Lithium, two of the world's rare-earth minerals. With ongoing debates over the energy consumption of data centres, there is evidence of some efficiencies over the recent past, largely because of the redundancy and replacement of less efficient facilitates. Now that many of the traditional energy-intensive smaller data centres have been phased out and replaced by hyperscale data centres, it is likely that we are at the early stages of the rebound effect. Even considering data centre efficiencies, electricity demand remains flat at present, but it is questionable what this demand will look like in a decade or so. To maintain and keep data centres running efficiently and effectively, a significant amount of power and energy is needed, in particular for cooling. When data is processed, heat is generated, and additional energy in the form of cooling is needed to prevent servers from overheating. This heat is often viewed and treated as waste and simply released into the atmosphere, so much more attention is needed by the industry on how such energy can be saved, redirected, and reused. One solution in terms of energy use is to locate such data centres in cooler regions and push the colder outside air into these facilities. There are also some possibilities to reuse such energy to heat homes, swimming pools, and greenhouses, or to feed this energy into regional grids.

From a socio-economical perspective, the digital tech sector is dominated by just a few extremely large online platform corporations (Bissinger, 2017) that, through their promotion of an on-demand consumer-dependent lifestyle and personalized advertising, are accelerating a consumerist culture of online shopping, increased packaging waste, unsustainable product air miles and parcel deliveries that are further fuelling the climate crisis (Chua, 2021). Our private lives are increasingly being appropriated and monetized by these digitized platforms and individuals are being manipulated in very sophisticated ways to operate against our better judgment to consume and accumulate more *stuff*, all of which harms the planet. In many discernible and complex ways, digitalization is simply automating the worst of consumer culture to accelerate the climate crisis. An ITV News undercover investigation, for example, revealed that thousands of unsold electronics, including laptops, smart TVs, and all their respective packaging, were being destroyed needlessly by Amazon (Pallot, 2021). These were all products that were unsold after a specific period or had been returned by customers, and according to Amazon's business model, it is often cheaper to destroy these goods and items than store them. Overall, the net contribution of digital ICTs to reducing negative environmental impacts has yet to be fully determined, sector by sector, and much of the debate and discussions are largely made up of platitudes and aspirations. Digital ICTs contribution to (over)consumption is more obvious as it digitizes, automates, and accelerates production and consumption, all of which challenge the constraint that is needed to tackle climate change.

Conclusions

This review of the ecological impacts of digitalization is a call for closer engagement with the environmental realities of the Digital Age, and how Big Tech has been largely allowed to determine its direction and future without much oversight or antagonism (Radu, 2020). Left unfettered, the industry will continue to pursue a consumer-dependent trajectory that is damaging to the planet. As the eminent educator, author, and environmental activist Chet Bowers (2016, p. xiii) put it: "while the digital technologies appear to be new, they are based on the same deep cultural assumptions that underlie the industrial/consumer-dependent culture that is overshooting the sustaining capacity of the earth's natural systems". But alternative pathways and futures are available to pursue. (Ferreboeuf et al., 2019) calls for a sober digital transition to a "lean" approach to ICT that will help limit emissions and refocus the industry to become truly "Green ICT."[25] Based on their past practices and conduct, the digital tech industry alone cannot be trusted to act appropriately without some oversight. The implications of this review may well be that cutting back on our insatiable appetite for devices, data, and services—-a personal digital sobriety approach—-is one way to prevent energy use from going into overdrive over the coming years. But in tandem with reducing our electronic device and energy consumption, governments and international organizations must be much more proactive and rigors in curtailing the excesses of Big Tech and digitalization. These corporations have every right to be for-profit-driven, but not at any cost. Their record in living up to their social and environmental responsibilities leaves a lot to be desired, so it is time that they are forced to disclose

25 The Shift Project calls for:
1. Companies and governments to adopt digital sobriety as a principle of action
2. Accelerate the awareness of the digital environmental impacts
3. Include environmental impacts as decision-making criteria
4. Enable organisations to manage their digital transition
5. Undertake carbon audits for digital projects
6. Improve the consideration of digital systemic aspects in key sectors
7. Implement those actions to the European level.

and own up to their material environmental failings and are held to account when they are deceitful or act against the public interest.

Some limitations of this study must be acknowledged. As a desktop review performed by a solo author, every attempt was made to capture and collect the most up-to-date literature and data, but this does have its limits in terms of time and scope, and some level of subjectivity is inevitable. In addition, it was not possible to cover every aspect of digitalization, but an attempt was made to cover the most significant elements and features, in particular concerning sustainability and the environment. The review adds vigor and impetus to discussions and debates around the sustainability of digitalization and challenges some of the assumptions, misapprehensions, and public utterances from the industry. Such a review challenges the industry's "do the right thing"[26] rhetoric and infers growing environmental concerns and draws more attention to the fact that greater civic and social responsibility is required from the industry: in the absence of which, regulation is needed to protect society and the planet. A sustainable Digital Age makes proper use of digital ICTs and knowledge for fostering and promoting a good life for all, current and future generations. This is achieved through "strengthening biological diversity, technological usability, economic wealth for all, political participation of all, and cultural wisdom, and achieving a sustainable digital future costs: it demands a conscious reduction of profits by not investing in the future of capital, but the future of humans, society, and nature" (Fuchs, 2008, p. 308).

26 Google's unofficial motto had long been 'don't be evil' but when they were reorganised under their new parent company Alphabet in 2015 an adjusted version of the motto was introduced: "do the right thing."

Author contributions

MH was solely responsible for the conceptualization, writing, and editing of this manuscript.

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Conflict of interest

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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References

Ahmad, S. (2020). The lithium triangle. *Harvard Int. Rev.* 41, 51–53. doi: 10.1353/ner.2020.0043

Akpan, D. A., and Inyang, B. (2017). Economic diplomacy, global waste trade: The African perspective since the 20th century. *Afr. J. History Archaeol.* 2, 1–10. Available online at: https://www.iiardjournals.org/get/AJHA/VOL.%202%20NO.%201%202017/Economic%20Diplomacy.pdf

Altrudi, S. (2021). Connecting to nature through tech? The case of the iNaturalist app. *Convergence* 27, 124–141. doi: 10.1177/1354856520933064

Amnesty International (2016). *This Is What We Die for - Human Rights Abuses in the Democratic Republic of the Congo Power the Global Trade in Cobalt*. London: Amnesty International Ltd.

Amnesty International (2017). *Time to Recharge: Corporate Action and Inaction to Tackle Abuses in the Cobalt Supply Chain*. London: Amnesty International Ltd.

Andrae, A. (2017). Total consumer power consumption forecast. *Nordic Digital Business Summit* 10:69. Available online at: https://www.researchgate.net/publication/320225452_Total_Consumer_Power_Consumption_Forecast

Arts, K., van der Wal, R., and Adams, W. M. (2015). Digital technology and the conservation of nature. *Ambio* 44, 661–673. doi: 10.1007/s13280-015-0705-1

Avaaz (2020). *Why is YouTube Broadcasting Climate Misinformation to Millions? YouTube is Driving its Users to Climate Misinformation and the World's Most Trusted Brands are Paying for it*. Delaware: Avaaz Foundation.

Bachelet, M., Kalkuhl, M., and Koch, N. (2021). *What if Working From Home Will Stick? Distributional and Climate Impacts for Germany*. Available online at: https://ssrn.com/abstract=3908857

Bakhiyi, B., Gravel, S., Ceballos, D., Flynn, M. A., and Zayed, J. (2018). Has the question of e-waste opened a Pandora's Box? An overview of unpredictable issues and challenges. *Environ. Int.* 110, 173–192. doi: 10.1016/j.envint.2017.10.021

Balińska, A., Jaska, E., and Werenowska, A. (2021). The role of eco-apps in encouraging pro-environmental behavior of young people studying in Poland. *Energies* 14:4946. doi: 10.3390/en14164946

Banza Lubaba Nkulu, C., Casas, L., Haufroid, V., De Putter, T., Saenen, N. D., Kayembe-Kitenge, T., et al. (2018). Sustainability of artisanal mining of cobalt in DR Congo. *Nat. Sustain.* 1, 495–504. doi: 10.1038/s41893-018-0139-4

Barakos, G., Mischo, H., and Gutzmer, J. (2018). A forward look into the US rare-earth industry: How potential mines can connect to the global REE market. *Mining Eng.* 70, 30–37. Available online at: https://www.scopus.com/record/display.uri?eid=2-s2.0-85050930098&origin=inward&txGid=39dbc2929b563d74f36caad4bce76fcf

Barrero, J. M., Bloom, N., and Davis, S. J. (2020). *60 Million Fewer Commuting Hours Per Day: How Americans Use Time Saved by Working From Home*. University of Chicago, Becker Friedman Institute for Economics Working Paper. doi: 10.2139/ssrn.3695188

Baumann-Pauly, D. (2020). *Why Cobalt Mining in the DRC Needs Urgent Attention. Africa in Transition and Africa Program*. Available online at: https://www.cfr.org/blog/why-cobalt-mining-drc-needs-urgent-attention

Belkhir, L., and Elmeligi, A. (2018). Assessing ICT global emissions footprint: Trends to 2040 & recommendations. *J. Clean. Prod.* 177, 448–463. doi: 10.1016/j.jclepro.2017.12.239

Beresford, A. E., Donald, P. F., and Buchanan, G. M. (2020). Repeatable and standardised monitoring of threats to Key Biodiversity Areas in Africa using Google Earth Engine. *Ecol. Indic.* 109:105763. doi: 10.1016/j.ecolind.2019.105763

Berners-Lee, M. (2020). *How Bad Are Bananas? The Carbon Footprint of Everything*. London: Profile Books.

Bissinger, C. (2017). *Tech Giants and Digital Domination*. New York, NY: Greenhaven Publishing LLC.

Bowers, C. A. (2016). *Digital Detachment: How Computer Culture Undermines Democracy*. New York, NY: Routledge. doi: 10.4324/9781315643540

Brennan, M., and Archibald, P. (2019). *The Economic Cost of Recorded Music: Findings, Datasets, Sources, and Methods [Key Findings]*. Available online at: http://eprints.gla.ac.uk/183249/

Burgess, J., Bedford, T., Hobson, K., Davies, G., and Harrison, C. (2003). "(Un)sustainable consumption," in *Negotiating Environmental Change: New Perspectives from Social Science*, eds F. Berkhout, M. Leach, and I. Scoones (Cheltenham: Edward Elgar).

Bush, M. J. (2020). "Denial and deception," in *Climate Change and Renewable Energy: How to End the Climate Crisis* (Palgrave Macmillan). doi: 10.1007/978-3-030-15424-0_8

Caldarola, B., and Sorrell, S. (2022). Do teleworkers travel less? Evidence from the English National Travel Survey. *Transport. Res. A: Policy Pract.* 159, 282–303. doi: 10.1016/j.tra.2022.03.026

Cao, Z., Zhou, X., Hu, H., Wang, Z., and Wen, Y. (2022). Towards a systematic survey for carbon neutral data centers. *IEEE Commun. Surveys Tutor.* 24, 895–936. doi: 10.1109/COMST.2022.3161275

Carrington, D., and Taylor, M. (2022). *Revealed: the 'Carbon Bombs' Set to Trigger Catastrophic Climate Breakdown in The Guardian Weekly*. London: The Guardian.

CCAF (2022). *Cambridge University Bitcoin Electricity Consumption Index [Online]*. Cambridge: Cambridge Centre for Alternative Finance, Cambridge University.

Cerri, J., Testa, F., and Rizzi, F. (2018). The more I care, the less I will listen to you: How information, environmental concern and ethical production influence consumers' attitudes and the purchasing of sustainable products. *J. Clean. Prod.* 175, 343–353. doi: 10.1016/j.jclepro.2017.12.054

Cheng, M.-J., Hung, S.-W., Tsai, H.-H., and Chou, Y.-C. (2020). Fostering environmentally responsible consumer behavior: a hierarchical approach toward smartphone recycling. *IEEE Transact. Eng. Manage.* 2020:21818380. doi: 10.1109/TEM.2020.3007605

Chua, J. M. (2021). *Online Shopping Has Boomed in the Pandemic. But What About All the Packaging?* Washington, DC: Vox Media.

Cinelli, M., Morales, G. D. F., Galeazzi, A., Quattrociocchi, W., and Starnini, M. (2021). The echo chamber effect on social media. *Proc. Nat. Acad. Sci. U.S.A.* 118, 1–8. doi: 10.1073/pnas.2023301118

Coherent Market Insight (2022). *Consumer Electronics [Online]*. Seattle, WA: Coherent Market Insights Pvt Ltd.

Crow, D., and Millot, A. (2020). *Working From Home Can Save Energy and Reduce Emissions. But How Much?* Available online at: https://www.iea.org/commentaries/working-from-home-can-save-energy-and-reduce-emissions-but-how-much (accessed May 10, 2022).

CSO (2022). *Data Centres Metered Electricity Consumption* 2020. Cork: Central Statistics Office.

D'Arco, M., and Marino, V. (2022). Environmental citizenship behavior and sustainability apps: an empirical investigation. *Transform. Govern. People Process Policy* 16, 185–202. doi: 10.1108/TG-07-2021-0118

Datacenters (2022). *Cambridge, UK: Datacente.re World Map | OpenstreetMap*. Available online at: https://map.datacente.rs/ (accessed May 31, 2022).

Donaghy, T., Henderson, C., and Jardim, E. (2019). *Oil in the Cloud: How Tech Companies are Helping Big Oil Profit From Climate Destruction*. Washington, DC: Greenpeace.

Dwivedi, Y. K., Hughes, L., Kar, A. K., Baabdullah, A. M., Grover, P., Abbas, R., et al. (2022). Climate Change and COP26: Are digital technologies and information management part of the problem or the solution? An editorial reflection and call to action. *Int. J. Inform. Manage.* 63:102456. doi: 10.1016/j.ijinfomgt.2021.102456

Efoui-Hess, M. (2019). *Climate Crisis: The Unsustainable Use of Online Video*. Paris: The Shift Project.

European Commission (2015). *Towards an Integrated Strategic Energy Technology (SET) Plan: Accelerating the European Energy System Transformation*.

Eurostat (2021). *Energy Consumption in Households*. Luxembourg: European Commission, Eurostat.

Faber, G., Mangin, C., and Sick, V. (2021). Life Cycle and techno-economic assessment templates for emerging carbon management technologies. *Front. Sustain.* 2:e764057. doi: 10.3389/frsus.2021.764057

Feroz, A. K., Zo, H., and Chiravuri, A. (2021). Digital transformation and environmental sustainability: A review and research agenda. *Sustainability* 13:1530. doi: 10.3390/su13031530

Ferreboeuf, H., Berthoud, F., Bihouix, P., Fabre, P., Kaplan, D., Lefèvre, L., et al. (2019). *Lean ICT: Towards Digital Sobriety*. Paris: The Shift Project.

Forti, V., Balde, C. P., Kuehr, R., and Bel, G. (2020). *The Global E-Waste Monitor 2020: Quantities, Flows and the Circular Economy Potential*. Bonn: United Nations University/United Nations Institute for Training and Research, International Telecommunication Union, and International Solid Waste Association.

Freitag, C., Berners-Lee, M., Widdicks, K., Knowles, B., Blair, G. S., and Friday, A. (2021). The real climate and transformative impact of ICT: A critique of estimates, trends, and regulations. *Patterns* 2:100340. doi: 10.1016/j.patter.2021.100340

Fuchs, C. (2008). The implications of new information and communication technologies for sustainability. *Environ. Dev. Sustain.* 10, 291–309. doi: 10.1007/s10668-006-9065-0

Fuchs, C. (2021). *Social Media: A Critical Introduction*. London: Sage. doi: 10.4324/9781003199182-1

Gai, X. (2022). Intelligent advertising design strategy based on internet of things technology. *Wireless Commun. Mobile Comput.* 2022:5163330. doi: 10.1155/2022/5163330

Gallersdörfer, U., Klaaßen, L., and Stoll, C. (2020). Energy consumption of cryptocurrencies beyond bitcoin. *Joule* 4, 1843–1846. doi: 10.1016/j.joule.2020.07.013

Gayle, D. (2021). Vinyl turns tables as UK sales take highest market share since 1990. *Guardian Music*. Available online at: https://www.theguardian.com/music/2021/dec/29/vinyl-uk-sales-highest-market-share-since-1990 (accessed June 09, 2022).

Gillis, A. S. (2022). *What is the Internet of Things (IoT)?* Newton, MA: TechTarget.

Gollakota, A. R., Gautam, S., and Shu, C.-M. (2020). Inconsistencies of e-waste management in developing nations–Facts and plausible solutions. *J. Environ. Manage.* 261:110234. doi: 10.1016/j.jenvman.2020.110234

Greenpeace, Friends of the Earth, and Avaaz (2022). *In the Dark: How Social Media Companies Climate Disinformation Problem is hidden from the Public*. Washington, DC: A Report by Friends of the Earth, Avaaz, and Greenpeace USA.

Gu, F., Summers, P. A., and Hall, P. (2019). Recovering materials from waste mobile phones: Recent technological developments. *J. Clean. Prod.* 237:117657. doi: 10.1016/j.jclepro.2019.117657

Gundaboina, L., Badotra, S., Bhatia, T. K., Sharma, K., Mehmood, G., Fayaz, M., et al. (2022). Mining cryptocurrency-based security using renewable energy as source. *Security Commun. Netw.* 2022:4808703. doi: 10.1155/2022/4808703

Haines, D. (2021). *Kindle Reader Sales - The E-Reader Device Is Dying A Rapid Death*. Available online at: https://justpublishingadvice.com/the-e-reader-device-is-dying-a-rapid-death/ (accessed November 11, 2022)

Hari, J. (2022). *Stolen Focus: Why You Can't Pay Attention*. London: Bloomsbury Publishing.

Hazas, M., and Nathan, L. P. (2018). *Digital Technology and Sustainability: Engaging the Paradox*. New York, NY: Routledge. doi: 10.9774/gleaf.9781315465975

Heredia, F., Martinez, A. L., and Surraco Urtubey, V. (2020). The importance of lithium for achieving a low-carbon future: overview of the lithium extraction in the 'Lithium Triangle'. *J. Energy Nat. Resourc. Law* 38, 213–236. doi: 10.1080/02646811.2020.1784565

Herlo, B., Irrgang, D., Joost, G., and Unteidig, A. (2021). *Practicing Sovereignty: Digital Involvement in Times of Crises*. Bielefeld: Transcript Verlag. doi: 10.1515/9783839457603

Hintemann, R., and Hinterholzer, S. (2019). *Energy Consumption of Data Centers Worldwide*. Business, Computer Science.

Hohenlohe, P. A., Funk, W. C., and Rajora, O. P. (2021). Population genomics for wildlife conservation and management. *Mol. Ecol.* 30, 62–82. doi: 10.1111/mec.15720

Hojnik, J., Ruzzier, M., and Konečnik Ruzzier, M. (2019). Transition towards sustainability: Adoption of eco-products among consumers. *Sustainability* 11:4308. doi: 10.3390/su11164308

Hook, A., Sovacool, B. K., and Sorrell, S. (2020). A systematic review of the energy and climate impacts of teleworking. *Environ. Res. Lett.* 15:093003. doi: 10.1088/1748-9326/ab8a84

Hsu, E., Durning, C. J., West, A. C., and Park, A.-H. A. (2021). Enhanced extraction of copper from electronic waste via induced morphological changes using supercritical CO_2. *Resourc. Conserv. Recycl.* 168:105296. doi: 10.1016/j.resconrec.2020.105296

Hussain, C. M. (2021). *Environmental Management of Waste Electrical and Electronic Equipment*. Amsterdam: Elsevier.

Huynh, A. N. Q., Duong, D., Burggraf, T., Luong, H. T. T., and Bui, N. H. (2022). Energy consumption and Bitcoin market. *Asia-Pacific Financ. Markets* 29, 79–93. doi: 10.1007/s10690-021-09338-4

Hynes, M. (2013). What's smart about working from home: telework and the sustainable consumption of distance in Ireland? in: *Internet Research, Theory, and Practice: Perspectives from Ireland,* eds. C. Fowley, C. English, and S. Thouësny (Dublin: Research-Publishing). doi: 10.14705/rpnet.2013.000090

Hynes, M. (2021). *The Social, Cultural and Environmental Costs of Hyper-connectivity: Sleeping through the Revolution*. Bingley: Emerald Group Publishing. doi: 10.1108/9781839099762

IEA (2017). *Digitalization & Energy*. Paris: International Energy Agency.

Ilankoon, I., Ghorbani, Y., Chong, M. N., Herath, G., Moyo, T., and Petersen, J. (2018). E-waste in the international context: A review of trade flows, regulations, hazards, waste management strategies and technologies for value recovery. *Waste Manage.* 82, 258–275. doi: 10.1016/j.wasman.2018.10.018

IndustryWired (2022). *AI in Wildlife Conservation: Learn About the Latest Trends*. Available online at: https://industrywired.com/ai-in-wildlife-conservation-learn-about-the-latest-trends/ (accessed May 09, 2022).

InfluenceMap (2021). *Big Tech and Climate Policy: Are the Technology Giants Deploying Political Capital on Climate Change?* London: InfluenceMap.

IPCC (2020). *Clean Energy Innovation. IPCC 2014 Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Geneva: Intergovernmental Panel on Climate Change (IPCC).

IPCC (2022). *Climate Change 2022: Mitigation of climate change. Working Group III Contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. Geneva: Intergovernmental Panel on Climate Change (IPCC).

Jaroni, M. S., Friedrich, B., and Letmathe, P. (2019). Economical feasibility of rare earth mining outside China. *Minerals* 9:576. doi: 10.3390/min9100576

Jones, N. (2018). The information factories. *Nature* 561, 163–166. doi: 10.1038/d41586-018-06610-y

Jungblut, S.-I. (2019). *Our Digital Carbon Footprint: What's the Environmental Impact of the Online World? Reset: Digital for Good*. Available online at: https://en.reset.org/our-digital-carbon-footprint-environmental-impact-living-life-online-12272019/ (accessed May 31, 2022).

Junior, B. A., Majid, M. A., and Romli, A. (2018). Green information technology for sustainability elicitation in government-based organisations: an exploratory case study. *Int. J. Sustain. Soc.* 10, 20–41. doi: 10.1504/IJSSOC.2018.092648

Kaiman, J. (2014). *Rare Earth Mining in China: The Bleak Social and Environmental Costs the Guardian Weekly*. London: The Guardian.

Kaminski, T., Scholze, M., Rayner, P., Voßbeck, M., Buchwitz, M., Reuter, M., et al. (2022). Assimilation of atmospheric CO2 observations from space can support national CO2 emission inventories. *Environ. Res. Lett.* 17:014015. doi: 10.1088/1748-9326/ac3cea

Kamiya, G. (2020a). *The Carbon Footprint of Streaming Video: Fact-Checking the Headlines*. Available online at: https://www.iea.org/commentaries/the-carbon-footprint-of-streaming-video-fact-checking-the-headlines (accessed May 31, 2022).

Kamiya, G. (2020b). *What is the carbon footprint of streaming video on Netflix? Factcheck*. Available online at: https://www.carbonbrief.org/factcheck-what-is-the-carbon-footprint-of-streaming-video-on-netflix/ (accessed May 31, 2022).

Kamiya, G., and Kvarnström, O. (2019). *Data Centres and Energy – From Global Headlines to Local Headaches?* Available online at: https://www.iea.org/commentaries/data-centres-and-energy-from-global-headlines-to-local-headaches (accessed May 31, 2022).

Katzenbach, C., and Bächle, T. C. (2019). Defining concepts of the digital society. *Internet Policy Rev.* 8, 1–6. doi: 10.14763/2019.4.1430

Knutti, R. (2019). Closing the knowledge-action gap in climate change. One *Earth* 1, 21–23. doi: 10.1016/j.oneear.2019.09.001

Lange, S., Pohl, J., and Santarius, T. (2020). Digitalization and energy consumption. Does ICT reduce energy demand? *Ecol. Econ.* 176:106760. doi: 10.1016/j.ecolecon.2020.106760

Langkau, S., and Erdmann, M. (2021). Environmental impacts of the future supply of rare earths for magnet applications. *J. Indus. Ecol.* 25, 1034–1050. doi: 10.1111/jiec.13090

Lauvaux, T., Giron, C., Mazzolini, M., d'Aspremont, A., Duren, R., Cusworth, D., et al. (2022). Global assessment of oil and gas methane ultra-emitters. *Science* 375, 557–561. doi: 10.1126/science.abj4351

Lebbie, T. S., Moyebi, O. D., Asante, K. A., Fobil, J., Brune-Drisse, M. N., Suk, W. A., et al. (2021). E-waste in Africa: a serious threat to the health of children. *Int. J. Environ. Res. Public Health* 18:8488. doi: 10.3390/ijerph18168488

Leiserowitz, A. (2019). "Building public and political will for climate change action," in *A Better Planet: Big Ideas for a Sustainable Future*, ed D. C. Esty (New Haven, CT: Yale University Press). doi: 10.2307/j.ctvqc6gcq.21

Liobikiene, G., Mandravickaite, J., and Bernatoniene, J. (2016). Theory of planned behavior approach to understand the green purchasing behavior in the EU: A cross-cultural study. *Ecol. Econ.* 125, 38–46. doi: 10.1016/j.ecolecon.2016.02.008

Longo, C., Shankar, A., and Nuttall, P. (2019). "It's not easy living a sustainable lifestyle": How greater knowledge leads to dilemmas, tensions and paralysis. *J. Business Ethics* 154, 759–779. doi: 10.1007/s10551-016-3422-1

Lyons, G., Mokhtarian, P., Dijst, M., and Böcker, L. (2018). The dynamics of urban metabolism in the face of digitalization and changing lifestyles: Understanding and influencing our cities. *Resourc. Conserv. Recycl.* 132, 246–257. doi: 10.1016/j.resconrec.2017.07.032

Makonin, S., Marks, L. U., Przedpełski, R., Rodriguez-Silva, A., and ElMallah, R. (2022). *Calculating the Carbon Footprint of Streaming Media: Beyond the Myth of Efficiency*. LIMITS: Virtually Held. doi: 10.21428/bf6fb269.7625cc76

Mandula, K., Parupalli, R., Murty, C. A., Magesh, E., and Lunagariya, R. (2015). "Mobile based home automation using Internet of Things (IoT)," in: *2015 International Conference on Control, Instrumentation, Communication and Computational Technologies (ICCICCT)* (IEEE). doi: 10.1109/ICCICCT.2015.7475301

Marlow, T., Miller, S., and Roberts, J. T. (2020). *Twitter Discourses on Climate Change: Exploring Topics and the Presence of Bots*. Available online at: https://osf.io/preprints/socarxiv/h6ktm/ (accessed June 13, 2022). doi: 10.31235/osf.io/h6ktm

Masanet, E., Shehabi, A., Lei, N., Smith, S., and Koomey, J. (2020). Recalibrating global data center energy-use estimates. *Science* 367, 984–986. doi: 10.1126/science.aba3758

McCright, A. M., Charters, M., Dentzman, K., and Dietz, T. (2016). Examining the effectiveness of climate change frames in the face of a climate change denial counter-frame. *Top. Cogn. Sci.* 8, 76–97. doi: 10.1111/tops.12171

McGovern, G. (2020). *World Wide Waste: How Digital Is Killing Our Planet - and What We Can Do About it*. Meath: Silver Beach Publishing.

McPherson, M., Smith-Lovin, L., and Cook, J. M. (2001). Birds of a feather: Homophily in social networks. *Annu. Rev. Sociol.* 27, 415–444. doi: 10.1146/annurev.soc.27.1.415

Minx, J. C., Lamb, W. F., Callaghan, M. W., Bornmann, L., and Fuss, S. (2017). Fast growing research on negative emissions. *Environ. Res. Lett.* 12:035007. doi: 10.1088/1748-9326/aa5ee5

Mitchell, W. J. (1996). *City of Bits: Space, Place, and the Infobahn*. Cambridge, MA: MIT press. doi: 10.7551/mitpress/1847.001.0001

Moletsane, P. P., Motlhamme, T. J., Malekian, R., and Bogatmoska, D. C. (2018). "Linear regression analysis of energy consumption data for smart homes," in: *2018 41st International Convention on Information and Communication Technology, Electronics and Microelectronics (MIPRO)* (IEEE). doi: 10.23919/MIPRO.2018.8400075

Mora, C., Rollins, R. L., Taladay, K., Kantar, M. B., Chock, M. K., Shimada, M., et al. (2018). Bitcoin emissions alone could push global warming above 2 C. *Nat. Clim. Chang.* 8, 931–933. doi: 10.1038/s41558-018-0321-8

Nilsson, A., Wester, M., Lazarevic, D., and Brandt, N. (2018). Smart homes, home energy management systems and real-time feedback: Lessons for influencing household energy consumption from a Swedish field study. *Energy Build.* 179, 15–25. doi: 10.1016/j.enbuild.2018.08.026

Ohene Opare, E., and Mirkouei, A. (2021). "Environmental and economic assessment of a portable e-waste recycling and rare earth elements recovery process," in: *International Design Engineering Technical Conferences and Computers*

and Information in Engineering Conference (American Society of Mechanical Engineers). doi: 10.1115/DETC2021-68555

O'Regan, E. (2021). *Call for Moratorium on New Data Centres Until Benefits are Fully Examined*. The Irish Examiner.

Packey, D. J., and Kingsnorth, D. (2016). The impact of unregulated ionic clay rare earth mining in China. *Resources Policy* 48, 112–116. doi: 10.1016/j.resourpol.2016.03.003

Paetz, A.-G., Dütschke, E., and Fichtner, W. (2012). Smart homes as a means to sustainable energy consumption: A study of consumer perceptions. *J. Consumer Policy* 35, 23–41. doi: 10.1007/s10603-011-9177-2

Pallot, R. (2021). *Amazon Destroying Millions of Items of Unsold Stock in One of Its UK Warehouses Every Year, ITV News Investigation Finds [Online]*. London: ITV plc.

Pasternack, A. (2020). *The Environmental Costs (And Benefits) of Our Cell Phones. Science | Technology* [Online]. Available online at: https://www.treehugger.com/the-environmental-costs-and-benefits-of-our-cell-phones-4858551 (accessed May 11, 2022).

Patel, P. (2018). *Smartphones are Warming the Planet far More Than You Think. Daily Science* [Online]. Available online at: https://www.cnbc.com/2020/05/20/google-ai-greenpeace-oil-gas.html (accessed May 11, 2022).

Pierre, J., and Neuman, S. (2021). *How Decades of Disinformation About Fossil Fuels Halted U.S. Climate Policy. Climate* [Online]. Available online at: https://www.npr.org/2021/10/27/1047583610/once-again-the-u-s-has-failed-to-take-sweeping-climate-action-heres-why?t=1654290126364&t=1654713622340 (accessed June 08, 2022).

Radu, S. (2020). *The World Wants More Tech Regulation* [Online]. New York, NY: U.S.News.

rebuy (2021). *Mobile Phone E-Waste Index [Online]*. Berlin: rebuy recommerce GmbH.

Ritchie, H., Roser, M., and Rosado, P. (2020). *CO_2 and Greenhouse Gas Emissions. Our World in Data* [Online]. Available online at: https://ourworldindata.org/co2-and-other-greenhouse-gas-emissions#how-have-global-co2-emissions-changed-over-time

Romanello, M., McGushin, A., Di Napoli, C., Drummond, P., Hughes, N., Jamart, L., et al. (2021). The 2021 report of the Lancet Countdown on health and climate change: code red for a healthy future. *Lancet* 398, 1619–1662. doi: 10.1016/S0140-6736(21)01787-6

Royal Society (2020). *Digital Technology and the Planet: Harnessing Computing to Achieve Net Zero UK*. London: The Royal Society.

RSC (2022). *Precious Elements [Online]*. London: The Royal Society of Chemistry (RSC).

Runciman, D. (2018). *How Democracy Ends*. London: Profile Books.

Santos, G., and Azhari, R. (2022). Can we save GHG emissions by working from home? *Environ. Res. Commun.* 4:035007. doi: 10.1088/2515-7620/ac3d3e

Sareen, S., and Haarstad, H. (2021). Digitalization as a driver of transformative environmental innovation. *Environ. Innovation Soc. Transit.* 41, 93–95. doi: 10.1016/j.eist.2021.09.016

Setzer, J., and Higham, C. (2021). *Global Trends in Climate Change Litigation: 2021 Snapshot*. London: Grantham Research Institute on Climate Change and the Environment and Centre for Climate Change Economics and Policy, London School of Economics and Political Science.

Shaw-Williams, D. (2020). "The expanding role of home energy management ecosystem: an Australian case study," in: *Behind and Beyond the Meter: Digitalization, Aggregation, Optimization, Monetization*, ed F. Sioshansi (Elsevier). doi: 10.1016/B978-0-12-819951-0.00007-4

Silver, L. (2019). *Smartphone Ownership Is Growing Rapidly Around the World, But Not Always equally*. (Washington, DC: Pew Research Center.

Sovacool, B. K., and Del Rio, D. D. F. (2020). Smart home technologies in Europe: A critical review of concepts, benefits, risks and policies. *Renewable Sustain. Energy Rev.* 120:109663. doi: 10.1016/j.rser.2019.109663

Speaker, T., O'Donnell, S., Wittemyer, G., Bruyere, B., Loucks, C., Dancer, A., et al. (2021). A global community-sourced assessment of the state of conservation technology. *Conserv. Biol.* 36:e13871. doi: 10.1111/cobi.13871

Stackl, V. (2020). *New Greenpeace Report Exposes Big Tech Connection to Big Oil [Online]*. Washington, DC: Greenpeace.

Stančič, Z. (2012). *Leveraging ICT's Potential: By Mr Zoran Stančič, Deputy Director-General, European Commission, Directorate-General for Communications Networks, Content and Technology [Online]*. Hertfordshire: European Energy Innovation.

Statista (2021). *Global E-Waste - Statistics & Facts*. Hamburg: Statista GmbH.

Statista (2022a). *Global Spam Volume as a Percentage of Total E-Mail Traffic From January 2014 to December* 2021 *by Month*. Hamburg: Statista GmbH.

Statista (2022b). *Number of Data Centers Worldwide in* 2022 *by Country*. Hamburg: Statista GmbH.

Stewart, D., and Crossan, G. (2022). *Consumer Electronics Sales: During the Pandemic, Computer and TV Sets Outgrew Smartphones*. Deloitte. Available online at: https://www2.deloitte.com/xe/en/insights/industry/technology/consumer-electronics-sales-growth-covid-19.html (accessed October 25, 2022).

Ström, T. E. (2019). "Into the glorious future: the utopia of cybernetic capitalism according to Google's ideologues," in: *Revisiting the Global Imaginary,* eds C. Hudson and E. K. Wilson (Cham: Palgrave Macmillan). doi: 10.1007/978-3-030-14911-6_7

Suckling, J., and Lee, J. (2015). Redefining scope: the true environmental impact of smartphones? *Int. J. Life Cycle Assessment* 20, 1181–1196. doi: 10.1007/s11367-015-0909-4

Suldovsky, B. (2017). "The information deficit model and climate change communication," in *Oxford Research Encyclopaedia of Climate Science* Oxford: Oxford University Press. doi: 10.1093/acrefore/9780190228620.013.301

Susskind, J. (2022). *The Digital Republic: On Freedom and Democracy in the 21st Century*. London: Bloomsbury Publishing.

Tayebi-Khorami, M., Edraki, M., Corder, G., and Golev, A. (2019). Re-thinking mining waste through an integrative approach led by circular economy aspirations. *Minerals* 9:286. doi: 10.3390/min9050286

Taylor, T. E., O'Dell, C. W., Frankenberg, C., Partain, P. T., Cronk, H. Q., Savtchenko, A., et al. (2016). Orbiting Carbon Observatory-2 (OCO-2) cloud screening algorithms: validation against collocated MODIS and CALIOP data. *Atmospheric Measure. Tech.* 9, 973–989. doi: 10.5194/amt-9-973-2016

The Enerdata Yearbook (2021). *Electricity Domestic Consumption*. Grenoble: World Energy & Climate Statistics - Yearbook 2021.

Timperley, J. (2022). *Can eyes in the Sky Help Cut Methane? The Guardian Weekly*. London: The Guardian.

UNEP (2010). *Introductory Note to the Basel Convention by Dr. Katharina Kummer Peiry, Executive Secretary of the Basel Convention.* Available online at: https://legal.un.org/avl/ha/bcctmhwd/bcctmhwd.html (accessed May 25, 2022).

UNFCCC (2021). *Innovative Technology Key to Climate Action*. Bonn: United Nations Framework Convention on Climate Change.

Upadhyay, C., and Watkins, D. (2021). *Global Consumer Electronics Market Forecasts 2014-2024: Forecast Update Summary*. Boston, MA: Strategy Analytics.

Urakami, J., Kim, Y., Oura, H., and Seaborn, K. (2022). "Finding strategies against misinformation in social media: A qualitative study," in: *CHI Conference on Human Factors in Computing Systems Extended Abstracts: Association for Computing Machinery*.

van der Wal, R., and Arts, K. (2015). Digital conservation: An introduction. *Ambio* 44, 517–521. doi: 10.1007/s13280-015-0701-5

Villeneuve, H., Abdeen, A., Papineau, M., Simon, S., Cruickshank, C., and O'Brien, W. (2021). New insights on the energy impacts of telework in Canada. *Canad. Public Policy* 47, 460–477. doi: 10.3138/cpp.2020-157

Vogels, E. A., Rainie, L., and Anderson, J. (2020). *Experts Predict More Digital Innovation by 2030 Aimed at Enhancing Democracy*. Washington, DC: Pew Research Center.

WEF (2019). *A New Circular Vision for Electronics: Time for a Global Reboot.* Cologny/Geneva: World Economic Forum: The Platform for Accelerating the Circular Economy (PACE) and E-Waste Coalition.

Wei, Y. (2022). Advertising image design skills of e-commerce products in the context of the internet of things. *Mobile Inform. Syst.* 2022:1022825. doi: 10.1155/2022/1022825

Whiting, K. (2021). *Book Sales Are Up: This Is What We've Been Reading During the Pandemic. On the Agenda*. Available Online at: https://www.weforum.org/agenda/2021/05/covid-19-book-sales-reading/ (accessed June 9, 2022).

Wich, S. A., and Koh, L. P. (2018). Conservation drones: Mapping and monitoring biodiversity. London: Oxford University Press. doi: 10.1093/oso/9780198787617.001.0001

Williams, H. T., McMurray, J. R., Kurz, T., and Lambert, F. H. (2015). Network analysis reveals open forums and echo chambers in social media discussions of climate change. *Glob. Environ. Change* 32, 126–138. doi: 10.1016/j.gloenvcha.2015.03.006

Willoughby, L. (2017). Inner Workings: SMART collars help track and conserve wildlife. *Proc. Nat. Acad. Sci. U.S.A.* 114, 3266–3268. doi: 10.1073/pnas.1701956114

Wu, J., Guo, S., Huang, H., Liu, W., and Xiang, Y. (2018). Information and communications technologies for sustainable development goals: state-of-the-art, needs and perspectives. *IEEE Commun. Surveys Tutor.* 20, 2389–2406. doi: 10.1109/COMST.2018.2812301

Zhang, T., Zhang, P., Peng, K., Fengs, K., Fang, P., Chen, W., et al. (2022). Allocating environmental costs of China's rare earth production to global consumption. *Sci. Total Environ.* 831:154934. doi: 10.1016/j.scitotenv.2022.154934

Zhuravskaya, E., Petrova, M., and Enikolopov, R. (2020). Political effects of the internet and social media. *Annu. Rev. Econom.* 12, 415–438. doi: 10.1146/annurev-economics-081919-050239

Zilian, S. S., and Zilian, L. S. (2020). Digital inequality in Austria: Empirical evidence from the survey of the OECD "Programme for the International Assessment of Adult Competencies." *Technol. Soc.* 63:101397. doi: 10.1016/j.techsoc.2020.101397

Zuboff, S. (2019). *The Age of Surveillance Capitalism: The Fight for a Human Future at the New Frontier of Power*. London: Profile Books Ltd.

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Do sustainable food system innovations foster inclusiveness and social cohesion? A comparative study

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Introduction: Existing food systems are not only responsible for severe environmental damage, but also face pressing social challenges, with people having uneven access to safe and healthy food, good working conditions, and political participation. These socio-ethical aspects play a key role in successful food transitions. So far, aspects of social cohesion and inclusiveness within social food innovations have rarely been analyzed in more depth. Many social innovations have emerged over the last few decades, such as land cooperatives, farm leasing models, community-supported agriculture, or citizen shareholder companies. Expectations towards these financing models vary from facilitating more investment in a sustainable and socially responsible agri-food sector and a shift towards more local food to the creation of transparent relationships between food producers and consumers.

Objectives: It is against this backdrop that this paper compares three different food innovations—citizen shareholder companies, community-supported agriculture, and food co-ops—regarding their inclusiveness, the degree of member involvement, and the quality of experienced connectedness.

Methods: Empirically, this paper draws on quantitative and qualitative data, including an online survey, two focus group discussions, and a broad literature search.

Results: Findings reveal that all food innovations show a rather low level of inclusiveness, although efforts are being made to overcome barriers to access. Food innovations generate social cohesion between different actors along the value-added chain, which is constituted differently in a more service-oriented versus a community-oriented model.

Discussion: Overall, these innovations provide key momentum towards the dominant food regime by rewarding producers for sustainable practices, establishing stronger producer–consumer relationships, and motivating consumers to assume shared responsibility. Based on the different approaches adopted, we consider the food innovations as complementary for food system transitions.

KEYWORDS

social innovations, inclusiveness, social cohesion, citizen shareholder company, community supported agriculture, food co-ops, food system transition

Introduction

The need to introduce changes to the global agri-food system is widely recognized since it is not only responsible for severe negative impacts for the environment, but also faces pressing social challenges, with people having uneven access to safe and healthy food, good working conditions, and political participation (IFPRI, 2020). These environmental and social imbalances are also captured by the United Nations Sustainable Development Goals, which call for an inclusive food transition to improve people's access to food, promote sustainable agriculture, and empower consumers (FAO, 2017).

There are different ways to initiate food system changes. Aside from reshaping the political or economic context of food systems, or counting on technological solutions, a growing body of studies highlights the importance of social innovations that focus on closer collaboration between producers and consumers (Smith and Seyfang, 2013; Jaeger-Erben et al., 2015; Moulaert et al., 2017).

Many of these social innovations have emerged over the last few decades in the form of land cooperatives, farm leasing models, community-supported agriculture, food co-ops, or citizen shareholder companies addressing the challenges of today's food systems. Expectations toward these financing models vary, ranging from increased of investment in sustainable and socially responsible agri-food businesses (Behrendt et al., 2022) and a shift toward more local or regional food (Preiss et al., 2017) to the creation of trustworthy and solidarity-based relationships between food producers and consumers (Partzsch, 2018). These new institutional arrangements also show promise with regard to turning consumers into food citizens who actively take responsibility for the transformation of existing food systems (Renting et al., 2012).

In a recent and highly comprehensive literature review on sustainability transitions, Köhler et al. (2019) plead for greater recognition of socio-ethical aspects, including questions of accessibility and cohesion, in innovation processes. Although some research on food system transitions already exists that addresses these aspects, in large part, these studies only discuss social food innovations in terms of challenging social issues (poor food access, malnutrition, and inequalities) (Kirwan et al., 2013; Allen et al., 2017) or promoting inclusive participation and empowerment in reconnected food value chains (Renting et al., 2012). So far, hardly any research has analyzed the importance of the quality of relationships in, and accessibility of, social innovations for sustainable food transitions.

To address this shortcoming, this paper compares three different food innovations regarding 1) their inclusiveness, specifically in terms of ensuring equal opportunity to participate, and 2) their contribution to social cohesion, including a) the level of active involvement and b) connectedness among members, capturing the quality of social relations within the social innovation (including relationships between involved consumers as well as between consumers and actors further along the value-added chain). In our discussion, we will consider the importance of inclusiveness and social cohesion in social innovations for food system transitions.

The cases of interest in this study are citizen shareholder companies (CSCs), community-supported agriculture (CSA) initiatives, and food co-ops. Each represents a social innovation that provides financing for sustainable agriculture and local production. These cases were chosen as they demonstrate various modes of producer–consumer cooperation and operate at different levels of the food system. The findings on CSCs are derived from our own empirical data (online survey, qualitative focus groups), while findings concerning the two other innovations are based on a broad literature search.

The following section introduces the key concepts of social innovation and food system transitions as well as inclusiveness and social cohesion, before we go on to describe the methods used for collecting and analyzing our empirical data. In our findings section, a brief overview of the food innovations (CSA, food co-ops, and CSCs) precedes an examination of the innovations' inclusiveness, degree of involvement, and connectedness. The final section discusses the implications of our findings for current research on social innovations in food transitions. The conclusion provides a reflection on the limitations of the study and several suggestions for further research.

Theoretical background

Social innovations in food system transitions

Research on food system transitions explores socio-technical pathways and innovative shifts in production and consumption systems and practices (Hinrichs, 2014). Considerable attention is given to the role of social innovation as a driver for the transition toward sustainable food systems (Bock, 2012; Smith and Seyfang, 2013; Moulaert et al., 2017).

The literature on food transition offers numerous definitions of social innovations. For our purposes, two frequently referenced approaches are considered. A first definition is based on the innovations' socially beneficial contributions toward sustainable development. It emphasizes the functional character of social innovations as they purposefully create novel solutions and enable structural improvements at a large scale (Moulaert et al., 2017). A second and more sociological-oriented approach defines innovations in a less normative but rather analytical sense. For instance, Howaldt and Schwarz (2010) describe social innovation as a "*new configuration of social practices [. . .]*" (22)

including organizational forms, understandings, and structures of social relationships as true alternatives to established routines (Jaeger-Erben et al., 2015).

Transition studies identify food innovations' varying potential to contribute to changes in current dominant food systems. From this point of view, the diffusion of innovations follows a path from protected niche-spaces[1] to the food regime[2] (Hinrichs, 2014). The velocity and vigor of innovation processes depends on their potential to react to current pressures exerted by the dominant food regime or market failures.

Our understanding of diffusion is grounded in transition research and refers to the development of social innovations *"along three potential routes"* (Seyfang and Longhurst, 2016, 4). Firstly, innovations scale up, for instance, through an increase in membership, market shares, sales, or activities. Secondly, they advance into other geographical regions or through the multiplication of similar initiatives in different social contexts. Thirdly, innovations are translated into the dominant regime and are (partially) adopted.

In accordance with Ingram et al. (2015), the diffusion of innovations depends on niche-regime interactions and their compatibility with the rationales and rules of the incumbent food regime. While incremental innovations are likely to diffuse rather quickly, this is more difficult for radical innovations. Additional factors that impact the unleashing of transformational potential are organizational capabilities (using existing networks to gain access to additional resources), communication strategies, available finances, and formal decision-making structures (Wunder et al., 2019). Another crucial factor is whether social learning processes are initiated and sustained among those involved. In transition research, it has been emphasized that social innovations increase their transformative capacity if knowledge is exchanged, people learn from each other and experiment with alternative practices and organizational forms (Loorbach et al., 2017). Köhler et al. (2019) underline the normative need for a stronger integration of a socio-ethical dimension in research on sustainability transitions. Some studies focusing on food system transitions have highlighted the role innovations play in responding to societal and distributional issues. This includes, for example, improving poor food access (Kirwan et al., 2013), diminishing malnutrition (Allen et al., 2017), or combating power imbalances in food value chains (Renting et al., 2012). Other studies are more concerned with enhancing the quality of social relations, creating pathways for more participation in food value chains, and sustaining a stronger connectedness of consumers (Papaoikonomou and Ginieis, 2017). Social innovations in the context of urban food movements are emphasized for their ability to foster community engagement, solidarity, and political empowerment, which transforms the traditional role of the passive consumer into a more proactive one (Renting et al., 2012).

The analysis of the role that particular food innovations can play in integrating people and supporting their relationships makes it possible to assess their potential to target food justice concerns and foster cohesion, but also to reflect on their transformational capacities to contribute to food system transitions. However, so far, an analytical view on building social cohesive relations in social innovation processes, as well as the extent of their inclusiveness for food system transformation, remain, for the most part, unexplored.

This paper addresses these gaps by comparing different food innovations in terms of their capacity of to ensure equal opportunities for people to participate (inclusiveness), members' involvement, and the quality of interpersonal relationships between the members and with other actors from the value-added chain (social cohesiveness).

Understanding inclusiveness and social cohesion

This paper draws on a concept of inclusiveness put forth by Talmage and Knopf (2017) to characterize one of the qualities of social food innovations. The authors describe inclusiveness as an indicator for the wellbeing of communities that provide equal opportunities for people to fully participate in or directly benefit from the community. Furthermore, inclusiveness is introduced as an outcome of inclusion processes, which strategically *"leverages human diversity"* (IBID, 9). Diversity itself highlights the socio-cultural and economic differences of members, which are seen as the resources of any community. Applied to our analysis of food innovations, inclusiveness builds on reaching out to a broad segment of the population without—explicitly or implicitly (e.g., due to their communicative, cultural, or socio-economic focus) —excluding any groups of people.

Foremost, the opportunities people have to participate in food innovations are related to the unequal distribution of individual resources (Schiefer and van der Noll, 2017). In other words, there is a risk that people with limited resources will be excluded. This could apply to those who do not possess the financial means, prior experience, or knowledge or who are lacking relevant social contact and support (Hinrichs and Kremer, 2002). Aside from these economic and social constraints, cultural aspects such as language, taste, or habits might also be decisive when it comes to addressing people in a way that incentivizes their participation (Galt et al.,

1 Niche spaces provide a protected environment where innovations are not obliged to operate under competitive market conditions. They might also receive support from incubator structures, public funding, research, or state subsidies (Hinrichs, 2014).

2 The concept of the food regime refers to currently dominant institutions, norms, and practices in which food is produced and consumed (Brunori et al., 2010).

2016). Moreover, participation opportunities can depend on spatial aspects, specifically the geographical accessibility of food innovations, which can become a barrier for less mobile people who live in remote regions with poor infrastructure (Markow et al., 2016). Voluntary involvement in food innovations might entail a considerable time investment, which, again, excludes those with limited time resources.

We are also interested in the concept of social cohesion with a specific focus on the quality of social relationships. Social cohesion receives considerable attention as a subject of ongoing social sciences research and also features prominently on government agendas, yet a consistent definition is still lacking. From a more general point of view, social cohesion refers to the connection of societal units and describes how "*people in a society 'cohere' or 'stick together*'" (Chan et al., 2006, 289). Theoretically, it can be further understood as a multidimensional concept that includes several somewhat overlapping components. Those components relevant for this analysis will be presented below.

Following the arguments of Schiefer and van der Noll (2017), as well as Dragolov et al. (2016), social cohesion consists of a relational dimension, which can be broken down into the quality of relationships and interactions that people have on the group level. The mutual benefits of these connections are captured by the notion of social capital that facilitates cooperation among individuals for getting "*things done*" (Putnam, 2007; 138). Furthermore, cohesive social relations require a certain level of trust, which is viewed as people's "*expectancy that others' behavior is predictable and is in principal lead by positive intentions*" (Schiefer and van der Noll, 2017; 586).

Another important aspect of the relational dimension of social cohesion is active involvement. People can become more or less involved and in many different ways: from civic participation in social and pro-environmental organizations to activism in political food movements. Active involvement not only requires that people are personally committed, but also that they feel responsible for a common good while putting private interests aside (Chan et al., 2006).

Being part of a living community where people assume responsibilities for one another can lead to a sense of belonging and connectedness. Schiefer and van der Noll (2017) subsume this identification process under an ideational dimension of social cohesion. However, connectedness can also be conceptualized by linking it to the proximity concept, which is widely applied in innovation research and in literature about changes in producer–consumer relationships through Alternative Food Networks (AFN) (Edelmann et al., 2019; Gugerell and Penker, 2020). Referring to this concept, a first form of connectedness emanates from social proximity, which is based on personal connections, implying also informal communication and knowledge flows. Aside from the personal closeness of a supportive and tight-knit community, connectedness can also result from identifying with regions and physical landscapes. This refers to a spatial view of community. Because long distances make face-to-face interactions or attending events more difficult, personal communities are highly dependent on close geographical proximity between members and places (Haney et al., 2015; Gernert et al., 2018). Lastly, connectedness can also result from common rules and practices as well as from shared values and understandings that are both reflected by the notion of either formal or informal institutional proximity. Due to the pursuit of common goals, members give a sense of purpose to their involvement, which is a major factor in identifying with the community (Papaoikonomou and Ginieis, 2017).

In our study, and on the basis of our theoretical considerations, we analyze and compare the level of inclusiveness and the generation of social cohesion by different social innovations. Table 1 provides a condensed overview of these concepts. The paper pursues the following research questions: Who participates in this type of social innovation, what are the access barriers, and which strategies exist to increase inclusiveness? To what extent are members involved and which responsibilities do they assume? How can the relationships within these initiatives be characterized and what is the basis for members' feeling of connectedness?

Case selection and methods

To study the aforementioned dimensions of social cohesion and inclusiveness in food system transitions, this paper compares the characteristics of three different food innovations. The empirical analysis mainly focuses on citizen shareholder companies (CSC) in Germany and compares these with two other social innovations: community-supported agriculture (CSA) and food co-ops. These cases were deliberately selected in accordance with several criteria. We needed to narrow down our search to cases that fall under the definition of food system innovations. All three selected cases aim for a sustainable food system transition and foster an alternative form of producer–consumer cooperation, while also addressing deficits in the food sector, including financing organic agriculture and establishing regional value chains. In line with our intention to compare different social food innovations, these cases represent various models of how consumers are involved in financing sustainable agriculture and supporting local producers. They differ in the level at which cooperation takes place (CSA: farm level; CSC and food co-ops: regional level). Since empirical analyses were only carried out for CSCs, we relied on available literature to conduct a comparison with the other two models. This was not the case for innovations such as land cooperatives or farm leasing models, and they have thus not been included in the comparison.

The results on CSA and food co-ops are based on secondary information from literature, which is a limitation of our comparative approach. Results may vary due to

TABLE 1 Applied dimensions and research questions.

Theoretical concepts	Applied dimensions	Research questions
Inclusiveness	Economic, social, cultural, and spatial inclusion/exclusion	Q1: Emphasis is put on who takes part in the social innovations, existing barriers, and strategies for inclusion.
Social cohesion – Involvement (Relational dimension)	Degree of involvement and uptake of responsibilities	Q2: Emphasis is put on people's involvement and commitment to take shared responsibility for a common good.
Social cohesion – Quality of social relations (Relational dimension)	Social relations and trust	Q3a: Emphasis is put on the quality of relationships and trust building.
Social cohesion – Identification (Ideational dimension)	Connectedness based on geographical, social, and institutional/value-based proximity	Q3b: Emphasis is put on the connectedness.

heterogenous approaches to obtaining data or can be affected by how "analytical concepts" are applied (Mills et al., 2006). Although we were careful to choose comparable literature (see below), this study does not aim to provide "best equivalency," but intends to use CSA and food co-ops as a reference point to gain insights into the heterogeneous field of food system innovations that target social issues.

In the empirical analyses of CSCs, we applied a mixed-methods approach. This included an online survey as well as two focus group discussions (Kuckartz et al., 2009; Schulz et al., 2012). In line with a transdisciplinary research tradition, we initially approached the CSC officials and made a request to study their social innovation as one of our case studies. During research, the interests and perspectives of the CSC officials were taken into account and integrated into the design process. Based on the presentation of the empirical findings, their interests to develop their innovation toward higher inclusiveness and cohesion were discussed.

The quantitative data were gathered through an online survey of the shareholders of three regional CSCs between May and October 2021. Following our sampling approach, we contacted all CSC groups regarding the survey, but only the three groups in our analysis responded. When we conducted our survey, the selected CSCs were among the four largest regional groups in Germany in terms of shareholder numbers. They had also existed for at least 3 years and were still growing, while the other CSC groups were recently founded. A total number of 416 out of 2,338 contacted shareholders participated in the survey, which equals a respondent rate of slightly under 18%. Also considering the interests of the CSC officials, the questions focused on social cohesion dimensions (see Table 1) including the shareholders' initial motivation to buy shares, their preferences for information exchange and involvement, the quality of relationships and level of trust, their sense of connectedness as well as on what they had learned from participating in the CSC. To be able to analyze inclusiveness, a set of socio-demographic questions on age, gender, living area, migration background, educational and professional qualifications, household size and income of shareholders was included. The data were analyzed by running descriptive statistics in SPSS. For the interpretation of findings, notes that had been taken from meetings with the CSC officials were additionally considered together with published reports and website information.

Furthermore, two focus group discussions with the shareholders of one CSC were carried out online in March 2022. Potential participants were randomly selected from a shareholder register to achieve higher diversity. The participants were assigned to two groups, which consisted of eight men and nine women. A short questionnaire, which had to be filled out in advance, showed us that the participants were of different ages (ranging between 30 and 70) and had been shareholders for varying periods, ranging from one up to several years.

The main purpose of the focus groups was to gain deeper insights into the main topics of the survey: inclusiveness and connectedness as well as quality of the relationships and involvement of the members. The discussions lasted two and a half hours. Both group discussions were videotaped and transcribed. The analysis involved a descriptive coding of the empirical material around the themes of connectedness, quality of social relationships, shareholder involvement, and aspects of in- and exclusion.

To be able to compare our findings on CSC with the two other food innovations (CSA and food co-ops), a broad literature search was carried out. Our search focused on literature that showed results on the socio-demographic background, motives, and values of members as well as the quality of relationships between members and cooperating entrepreneurs, and the degree of member involvement. The majority of articles referred to social innovations in Germany, Europe, or the US. Aside from online articles, this also included several book chapters and dissertations, a full-text search was conducted by using the databases of Google Scholar and Primo (the online catalog of TU Berlin). The following combination of search terms was used to identify relevant literature: "community

TABLE 2 Main characteristics of selected social food innovations.

	Citizen shareholder company (CSC)	Community supported agriculture (CSA)	Food co-op
Function	Financing organic agri-food enterprises based on social-ecological criteria	Securing the economic existence of organic farms by paying for weekly harvest shares in advance	Consumer-led cooperation that organizes collective food purchases
Objectives	Sustainable and regional food production, closing gaps in existing food value chains, solidarity-based relationships between producers and consumers	Supporting local and organic farming, providing access to healthy and high-quality food, democratic food control, closer producer–consumer relationships	Access to local organic and affordable produce, bypassing grocery chains, democratic food control, education
Organizational and legal structures	Joint stock company (AG) including board of directors (management), advisory board, and shareholders	Heterogeneity in terms of legal ("eG," "GmbH," or non-profit) and organizational models: service oriented, supportive, and self-organized	Heterogeneity in terms of legal ("eG," "GmbH," or non-profit) and organizational form as well as size
Numbers	Active in eight regions in Germany and one region in Austria, 3,000 shareholders, 100 cooperative agri-food enterprises, more than 10 million euros of share capital	Exists worldwide including 2,783 CSA farms in Europe and 400 CSA farms in Germany	Exists worldwide including 3,000 active food co-ops in Germany

supported agriculture" and "food co-ops" together with "socio-demographic," "member," "relationship," and "community." After an initial screening of the search results, we decided to reduce the number of publications based on their relevance to our research interest, publication date, and number of citations. Regarding indicators for inclusiveness, we only considered those studies that conducted member surveys and used the same standard socio-demographic variables we applied in our survey. In terms of the non-standardized qualitative findings on connectedness and involvement, we paid close attention to selecting and interpreting literature findings that had been conducted in an equivalent context (e.g., concerning size of innovations, location). A total of 37 documents were considered for analysis.

Main characteristics of the selected social food innovations

Citizen shareholder company

CSCs were initially founded in 2006 as an alternative to mainstream economic practices in industrialized agriculture (see Table 2). They aim to finance regional value creation and sustainable food production (Partzsch, 2018; Hiß, 2019). This is accomplished by selling shares to private investors (citizens) to finance sustainable food enterprises along the whole value chain, including organic farms, food manufacturers, stores, and delivery services. In their investment decisions, CSCs consider the social and ecological services provided by agri-food businesses instead of focusing on profitability and expected financial return. Another primary goal for the CSCs is to develop regional economic spaces that close gaps in regional value chains, build shared markets, but also form new solidarity-based relationships between producers and consumers (Gothe, 2018).

CSCs are legally structured as joint stock companies (*Aktiengesellschaft* or AG), which means that they comply with national regulations and formal requirements regarding the German Financing and Stock Market Law (*Aktiengesetz*). These are similar to the regulations that apply to business models in other national settings, such as the "corporation model" in the US. All CSCs have a board of directors whose members are responsible for management tasks and a supervisory board that provides expertise from different fields. Despite the common goal and the similarities in their organizational structure, regional CSCs are run independently and make their own investment decisions. If a CSC becomes insolvent, shareholders cannot recover their investment.

As of today, there are CSCs in eight regions across the whole of Germany. There is one more CSC in Austria, but so far, the innovation has not expanded further into other national settings. Altogether, German CSCs encompass more than 3,000 shareholders, 100 supported enterprises, and around 10 million euros of share capital. After a relatively slow development phase that lasted into 2010s, a rapid increase in the number of CSCs has been observed in recent years (Regionalwert Impuls, 2022).

Community-supported agriculture

As an alternative form of food production, CSA is characterized by a solidarity-based cooperation between consumers and local farmers. The idea behind CSA is that

consumers agree to pay for weekly harvest shares in advance so that the farmer is able to cover their business operation and labor costs. The concept was initially founded in Japan, Switzerland, and Germany in the 1960s, before further expanding to the US and, later, also to other European countries (Cone and Myhre, 2000; Ostrom, 2007; Schlicht et al., 2012.).

Today, a large number of CSA organizations exist worldwide, displaying a considerable heterogeneity in terms of their structure, size, operations, and legal forms [e.g., "eG, (registered cooperative)" "GmbH, (limited liability company)" or non-profit]. In accordance with Gruber (2020), three ideal organizational structures for CSA models can be identified (service oriented, supportive and self-organized), which are characterized by the workload and obligations to which members are committed.

Despite all of these differences, CSA is built on shared principles (DeLin and Ferguson, 1999; Schlicht et al., 2012). Organizations practice local and organic agriculture, including farming methods that protect biodiversity and soil fertility. They also aim to improve people's food choices and diets by giving access to healthy and high-quality edibles (Flora and Bregendahl, 2012). Another intention is to enhance the role of consumers since CSA provides an opportunity for more participation and democratic control over food production (Ostrom, 2007). By reinforcing closer producer–consumer relationships, CSA creates trustworthiness and transparency, which establishes a basis for improved mutual understanding (Cox et al., 2008).

Overall, CSA models are quite popular and have expanded successfully in recent decades. In an EU-wide study, it was estimated that at least 2,783 operating CSA farms exist, which, during 2015, had supplied food to approximately half a million people (Volz et al., 2016). Researchers also expected the concept of CSA to gain more popularity in the following years. For Germany, the numbers point in a similar direction. The Network for Solidarity-Based Agriculture (2022) lists at least 396 operating CSA farms. This number indicates a substantial growth, especially when compared to the situation in 2010 when only 19 farms had officially been documented (see Schlicht et al., 2012).

Food co-op

Food co-ops are jointly owned and also self-governed consumer co-operations that organize collective food purchases. Their activities range from collecting orders and buying mostly organic food products from regional farmers to distributing them among members (Rosol, 2020). The concept of food co-ops can be traced back to two different historical developments. The first mainly worker-owned cooperatives were formed as early as the 19th century to provide members with food at affordable prices (Knupfer, 2013). A second phase of food co-op formation was during the alternative food movement between the 1960s and 1970s (Little et al., 2010). This renewed popularity of food co-ops resulted from a general critique of the "modern" food industry, intensive farming, and mass production. As a counterweight to the conventional forms of food production and consumption, these innovations aim at facilitating better access to organic and natural produce grown from local and small-scaled farms (Zitcer, 2015).

Today, food co-ops appear in different organizational and legal forms, but can also vary greatly in their size. They range from *ad hoc* purchasing groups based on informal agreements to professionalized producer–consumer cooperatives that comprise an entire network of producers, wholesalers, owned grocery shops, and other food-related stakeholders. An example of one of the larger cooperatives in Germany is the producer–consumer cooperative TAGWERK (2022), which runs several shops with regular employees.

Most current food co-ops pursue goals that are related to at least one of the following aspects: I) they are committed to ethical and organic, and thus sustainable, production and consumption; II) they bypass grocery chains aiming for cheaper food prices; III) their democratic and community-oriented structure is an avenue for civic action to reclaim control over the local food supply; IV) they pursue an educational approach that involves informing members, for instance, about healthy or sustainable food choices (Little et al., 2010; Opitz et al., 2017). According to the National Association of Food Cooperatives (BZfE, 2020), there are more than 3,000 active food co-ops in Germany.

Findings

Inclusiveness

The findings of the online survey with CSC shareholders point toward limited inclusiveness since the socio-demographic background of the shareholders is not representative of the German population. Table 3 shows a more or less balanced gender distribution, yet with slightly more male shareholders. Furthermore, the typical shareholder is in middle to older age groups. While almost all shareholders show a high level of education, there are almost no shareholders with a migrant background. What is more, the majority of shareholders live in larger cities and suburbs. When comparing these numbers with the socio-demographic data for Germany, it appears that younger people, people with a migrant background or a lower level of education as well as people living in rural areas remain underrepresented (see Table 3). Finally, the shareholders mainly belong to higher income groups: More than half of the shareholder households have an available net household income of €4,000 or more per month. On average, the shareholders have a net household income of €4,275 [compared to the average net household income of €3,681 in Germany (Destatis, 2022)].

TABLE 3 Socio-demographic data of shareholders and for Germany.

Socio-demographics	Characteristics	Total	Shareholders	%	Mean (SD)	Socio- demographics (Germany 2019–2022[a])	Numbers (%)
Gender	Male	414	236	56.7		Male	41.2 Mio (49.2)
	Female		174	41.8		Female	42.5 Mio (50.2)
	Divers		4	1		Divers	-'
Age in years	18–20	409	0	0	55.37 (0.67)	18–20	15.4 Mio (18.5)
	20–40		60	14.7		20–40	20.3 Mio (24.4)
	40–60		186	45.5		40–60	23 Mio (27.7)
	60–80		152	37.2		60–80	18.3 Mio (22)
	80+		11	2.7		80+	6.1 Mio (7.3)
Monthly net-household income in euro	up to 1,500	361	12	3.3	4,274.93 (85.623)	Average monthly net-household income in euro	3,681 (on average)
	1,500 to 2,000		21	5.8			
	2,000 to 3,000		57	15.8			
	3,000 to 4,000		80	22.2			
	4,000 to 5,000		58	16.1			
	5,000 to 6,000		55	15.2			
	6,000 and more		78	21.6			
Formal education	High school diploma	401	358	89.3		High school diploma	23.6 Mio (33.5)
	Secondary school diploma		39	9.7		Secondary school diploma	21.2 Mio (30)
	Lower secondary school diploma		4	1		Lower secondary school diploma	20.2 Mio (28.6)
Migrant background	Without	415	408	98.3		Without migrant background	59.5 Mio (72.7)
	With		7	1.7		With migrant background	22.3 Mio (27.2)
Living area	Larger city	415	207	49.9		Larger cities	32.7 Mio (39.4)
	Sub-urban		99	23.9		Sub-urban and medium or small cities	33.5 Mio
	Medium or small city		71	17.1			
	Rural area		38	9.2		Rural area	16.8 Mio (20.2)

[a]Destatis (2019, 2022).

Recent studies on German CSA farms and food co-ops indicate a similar socio-demographic composition of their members. Overall, their member structure reveals little diversity since most members are highly educated, economically advantaged, have no migration background, and live in cities or sub-urban areas (Blättel-Mink et al., 2017; Boddenberg et al., 2017; Diekmann and Theuvsen, 2019). However, there are differences in terms of gender and age structure. Studies on those food innovations point to a stronger representation of women and to a middle-aged membership that is on average slightly younger than in CSCs. Similar findings are shown by studies from the US that analyzed the socio-demographic composition of members in CSA (Brehm and Eisenhauser, 2008; Haney et al., 2015; Galt et al., 2016) and food co-ops (Katchova and Woods, 2012; Zitcer, 2015).

There are many barriers to participating in this type of food innovation. For example, not everyone can afford to pay the subscription fees or shares. For CSCs, one share costs at least 500 euros, and CSA and food co-ops are also characterized by higher prices for organic food (Regionalwert AG Berlin-Brandenburg, 2022). However, a distinctive characteristic of food co-ops is that they usually offer organic food below market prices, which

makes them more attractive for members on small budgets. Co-ops can save money by buying in bulk, avoiding intermediate actors and obtaining wholesale prices (Little et al., 2010).

Besides economic constraints, the literature addresses further spatial and social-cultural obstacles in CSA and food co-ops, leading to the exclusion of certain groups of people (Kato, 2013; Papaoikonomou and Ginieis, 2017; Mert-Cakal and Miele, 2020). Firstly, studies point toward issues related to geographical distances. Some farms and depots in remote locations are difficult to reach, especially if people are less mobile or depend on public transport. Secondly, it is mentioned that a lack of know-how (Markow et al., 2016) or no prior experience with community activities could discourage people. For instance, Hibbert et al. (2001) identify a lack of self-efficacy as a hindering factor to becoming engaged in food co-ops as many do not feel confident enough to accept responsibilities in self-organized processes. Being unfamiliar with investment practices was also seen as an obstacle by the interviewed CSC shareholders. In both focus groups, the participants mentioned a lack of financial literacy and confidence as two important reasons that would particularly prevent women from becoming shareholders. This could be explained by the persistency of "traditional roles": Shareholders in both focus groups reported the impression that men usually remain responsible for financial matters in relationships even if the woman had taken the initiative.

Thirdly, Galt et al. (2016) and Kato (2013) identify cultural barriers for joining CSA organizations; food co-ops might face similar hurdles. People have their own food preferences based on culinary traditions. Exclusion can thus occur, if the initiatives do not offer a product range that covers the heterogeneity of distinctive cultural tastes.

How do the analyzed food innovations respond to these inclusiveness-related challenges? One of the more important management activities of CSCs is to attract new shareholders who are willing to invest their money. However, we were unable to identify a strong intention on part of CSC management to become more inclusive. For instance, the management of two CSCs reported at a work meeting that they do not actively reach out to people from a diverse background due to having limited time. Therefore, CSCs mainly rely on a pragmatic approach that involves addressing well-known target groups, including "politically engaged people," "young families," and "passionate gourmets." One of the CSCs had a significantly larger percentage of men among its shareholders. After we had shared the results with them, they showed considerable interest in addressing women more explicitly and asked for additional research in this field. Designing gender-specific focus groups was a response to this request.

Unlike the CSCs studied, there are many CSA farms that have purposively implemented inclusion strategies in order to challenge income barriers and reach the economically disadvantaged (Forbes and Harmon, 2008; Boddenberg et al., 2017). CSA initiatives advocate a concept of the solidarity-based economy, which provides people with equal opportunities to participate regardless of their background. For instance, this is reflected in the common practice of "bidding rounds" among some German CSA organizations. Bidding rounds serve the purpose of collecting the sum of capital to cover the annual costs of the farm and the farmer's income. However, it is left to the single members to decide how much they can afford to pay (Heyland, 2017). Other CSA models follow different approaches, which include financial charges based on members' income, internal money redistribution, subsidized membership, or the donation of surplus food (Guthman et al., 2006; Forbes and Harmon, 2008; Flora and Bregendahl, 2012).

Similar to CSA models, food co-ops use several strategies to increase inclusiveness as one of their core principles is to provide healthy and high-quality organic products at reasonable prices (Brunori et al., 2010). For instance, references are made to reduced fees for deprivileged households or price discounts in exchange for voluntary labor (Zitcer, 2015). However, Zitcer (2015) also describes the disadvantages inherent to this form of volunteering. Even if voluntary work provided by members lowers prices and makes food more affordable, people who do not have any spare time, for instance, because they have small children or demanding jobs, are still excluded.

Social cohesion

In this section, we examine the level of member involvement, including learning processes as well as their feelings of connectedness as dimensions of social cohesion.

Involvement

The findings on CSCs show that shareholders can be characterized by a rather low degree of active involvement. In total 79% of shareholders rarely or never acquire knowledge by attending events in person or through personal contact, preferring instead to stay informed by reading newsletters. Moreover, when specifically asked during focus groups to suggest ideas for supporting the CSCs, the majority of shareholders were willing to generate awareness for the company at work or among friends and family, but not to become more proactively involved, for instance, by organizing community events. Many mentioned considerable time constraints, long distances, or their commitment to other organizations as reasons for remaining in the background. Limited involvement on part of shareholders was also recognized by the management of the CSCs, according to whom only a handful of shareholders regularly show up despite their efforts to facilitate personal relationships between shareholders, management, and the producers. This includes the organization of farm visits, "one-to-one" meetings (with single farmers or managers of food enterprises), or events and the use of profiles, which shine a

light on the people behind the financially supported enterprises (Regionalwert AG Rheinland, 2022).

Given that the organization is legally structured as a stock cooperation, the involvement of shareholders is primarily restricted to formal rights. In accordance with official stock market regulation, this involves the right to participate and vote at the annual general meeting and the right to have access to financial information, which can be used to hold the management to account for their actions. Lastly, shareholders are entitled to receive dividend payments if a profit is generated.

In their role as "concerned sponsors," shareholders take on responsibility by investing money to support organic food production and improve food system sustainability. Although they have some expectations regarding financial returns, the primary intention is to show solidarity toward producers while also creating a positive social and environmental impact. The focus groups showed that shareholders were particularly convinced by the combination of environmental benefits, solidarity, and regional value creation, leading to their decision to buy shares. Thus, their investments are oriented toward a common good that provides public instead of private benefits. This is also shown by the survey results on shareholders' initial motivation to join the CSCs: While financial returns were a decisive factor for less than 2%, the most important motives mentioned were supporting regional organic agriculture (30%) and financing alternative business models (17%). However, some shareholders in the group discussions indicated that they do not see their engagement as a donation and expect that the CSC will be economically successful in the future.

Compared to the role of shareholders in CSCs, members of CSA initiatives are more proactively involved, yet their level of involvement mainly depends on the type of CSA organization (service oriented, supportive, or self-organized). Most of the members joined service oriented CSA organizations because of the convenience of gaining access to fresh and healthy food (Hinrichs and Kremer, 2002). This thus resembles a rather traditional consumer role. The members' engagement is mostly limited to collecting their weekly share of produce at pickup locations, visiting the farm, and participating in informal meetings. Only a few service-oriented CSA models offer the possibility of on-farm work, which is not mandatory but provides an opportunity to experience agricultural labor firsthand. Supportive CSA models are often initiated by consumers and encompass a higher level of membership engagement and involvement. Plenum meetings, to which all members are invited, are integral. These meetings give members the opportunity to discuss and vote on decisions together with the farmer. This concerns business operations and production methods or might also be related to the question of which crops should be grown (Mert-Cakal and Miele, 2020). Thirdly, the self-organized CSA models show the highest level of member involvement. Aside from farm work being mandatory, members are fully responsible for running the CSA initiative and the organization behind it. This includes various tasks, such as distributing shares, writing working plans, budgeting, organizing events, advertising, and networking (Opitz et al., 2017). Members are usually expected to commit a high level of time and energy, which often leads to frictions within the community as normally a core group of particularly motivated members take on most of the tasks. Frictions may arise in the form of complaints about those members who neglect community duties (Heyland, 2017).

Another part of CSA models are bidding rounds in which harvest shares and monthly member fees for the upcoming year are determined by contract. Together, the monetary contributions must cover the farm's labor costs and operation expenses in advance. By agreeing to these terms, members share the risks that are associated with agricultural production, including crop failure. Just as in CSCs, this alternative form of financing reveals a *"strong sense of civic responsibility"* (Cone and Myhre, 2000, 194). If harvest losses occur, members show solidarity toward food producers by bearing the risk of money loss without any return, and thus supporting the long-term existence of the farms.

The roles of members in food co-ops are similar to those in CSA organizations. The level of involvement, time, and effort put into voluntary activities mostly depends on the type and size of the food co-op. Therefore, some food co-ops emphasize that "*no responsibilities [are] attached to member-ownership*" (Schrank, 2018, 156), whereas others depend on the proactive engagement of their members (Caraher et al., 2014). In smaller food co-ops, members are mainly occupied with organizing the collective food purchases. Unlike CSA, food co-ops purchase their items in a rather straightforward manner from different farmers and food suppliers that have been selected by the members based on ecological and social criteria. The engagement further involves placing food orders and agreeing on delivery contracts, collecting the payments, and eventually picking up the food (Opitz et al., 2017; Rosol, 2020). As membership grows, it becomes necessary for food co-ops to rent a location that creates space for food to be stored in larger quantities. Members take on the additional tasks of storing products, cleaning, and organizing the depot, as well as managing finances. The largest types of food co-ops run their own supermarkets and must cope with logistical challenges as well as provide customer service. Most of these supermarkets are, however, also partially run by regular employees.

Similar to CSA, many food co-ops are also innovations based on democratic decision-making processes. Thus, regular meetings are usually organized either in the form of smaller working groups or larger plenum sessions. They provide each member with information, offer room for

discussion, and provide voting power on important matters regarding the future development of the food co-op (Rosol, 2020).

Food co-op members also aim to support community goods, but not in the form of responsible investments or shared production risks. In fact, many studies report that food co-ops show solidarity by accepting "fair" prices that guarantee sufficient earnings for the suppliers (Brunori et al., 2010; Fonte, 2013; Papaoikonomou and Ginieis, 2017). It also prohibits food co-op members from negotiating prices or putting pressure on suppliers, for instance, by asking for unilateral discounts.

Impacts of involvement: Social learning and change of food-related practices

Several studies indicate that participation in CSA and food co-ops has a positive impact on the membership because it is connected to healthier and more sustainable buying, cooking, and eating behavior (Ostrom, 2007; Allen et al., 2017; Opitz et al., 2017). This holds particularly true for low-income members who otherwise have only limited access to fresh and regional food (Hinrichs and Kremer, 2002). Moreover, CSA and food co-op membership also stimulates various learning effects that go beyond the question of where food comes from. Members train practical skills not only for cultivating food or organizing retail, but they also learn how to cook with seasonal products and gain more knowledge about nutritional values (Opitz et al., 2017). A better understanding of agri-food production conditions raises members' awareness of and appreciation for the work of farmers and further actors along the value chain. Moreover, these innovations can be understood as learning spaces for acquiring transformational knowledge by allowing members to experiment with alternative means of food production and self-organizing best practices. These settings can draw members' attention toward the "wicked" issue of non-sustainable food systems and strengthen food democracy by empowering members to formulate their own political demands (Kropp and Müller, 2018).

For the CSCs, the survey findings show that shareholders gain a better understanding of the economic situation facing organic food enterprises. Many of the respondents agreed or rather agreed on having learned more about the situation of regional agri-food businesses, including their financial needs (68.1%) and the major challenges they face (60.9%). To some extent, the shareholders also indicated that they had moderately changed their consumption behavior toward buying more organic (50.2%) and regional food items (62%). However, we assume that the shareholders had already practiced sustainable forms of consumption prior to their engagement.

Connectedness

Because of the limited proactive and personal engagement in CSCs, there is only moderate contact among shareholders and with other actors in the value chain (Behrendt et al., 2022). The survey findings show that a large proportion (79.5%) of the shareholders never or rarely obtain information through personal contact. This is also in line with findings from the focus groups: Close relationships were rarely mentioned as a decisive factor for feeling connected with the CSC.

Despite the absence of personal relationships, Figure 1 shows that a majority of the interviewed shareholders feel strongly connected with the financed food enterprises and, to lesser extent, with the CSC network. This is associated with shareholders trusting the management decisions since most of them believe in the future economic success of their respective CSC.

Extensive information offers play an important role in strengthening these feelings of connectedness and trust. The survey data show positive and significant correlations between how well members feel they are informed about investments ($p < 0.001$), business development ($p < 0.001$), and generated socio-ecological value ($p < 0.001$) and their sense of connectedness to the CSC network. In the focus groups, a member emphasized the relevance of transparent information as a sign of appreciation that leads to her feeling more connected. The management of CSCs emphasized maintaining trustworthy relationships with shareholders by providing them with comprehensive and transparent information. Much effort is put into sharing new information on the website and *via* a newsletter, as well as publishing annual status reports. These channels are used to inform shareholders of the long-term development of the CSCs, their investment decisions, and the socio-ecological performances of the supported food enterprises (see Fritz and Kaphengst, 2020).

The focus groups showed that, to a lesser extent, shareholders also feel emotionally connected to the geographical region, especially the regional cultural landscape. In this context, Behrendt et al. (2022) also point out that shareholders prefer to invest in regional businesses despite having no social contact either to other investors, the management, or to the supported food enterprises.

A particularly important factor for attachment to CSCs might result from a broad consensus about the pursued common goals, which can be summarized under the two aspects of promoting regional organic farming as well as establishing regional value chains. Almost all of the interviewed shareholders believed it is important to promote organic agriculture (92.9%), regional value chains (86%), and biodiversity (85.7%). However, the shareholders are also connected by a common critical attitude toward the conventional agri-food system and related policies. A majority is convinced that current agriculture does not promote animal welfare and climate protection, while

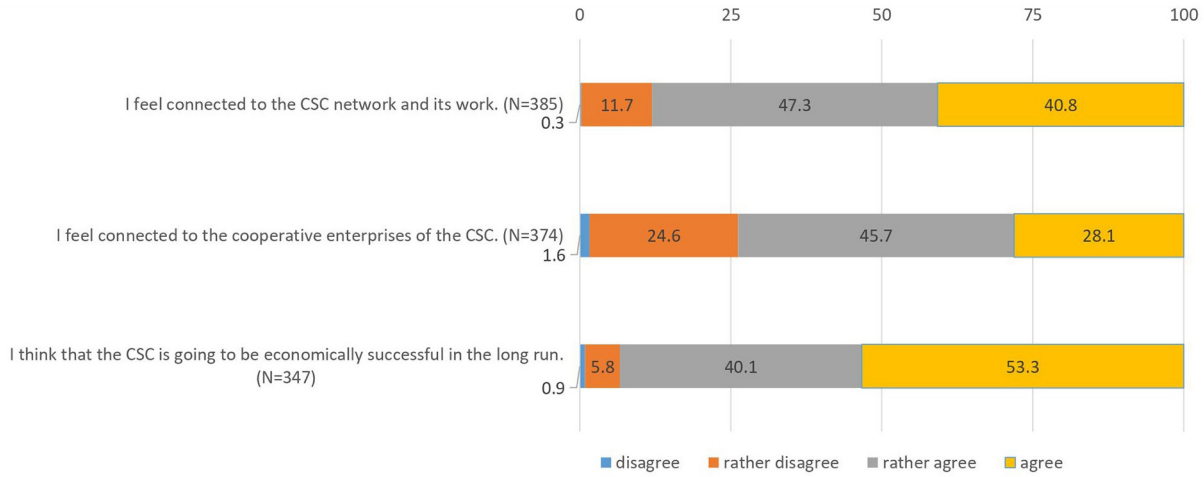

FIGURE 1
The shareholders sense of connectedness toward the supported food enterprises and the CSC network, as well as their confidence in the long-term economic success.

they also think that agricultural policies are mainly oriented toward the interests of the food industry. Criticism was also articulated in the focus groups, but mostly from men: They oppose industrial agriculture for "ruining the environment" and resulting in a problematic concentration of land ownership.

A considerably large body of research shows that even in CSA and food co-ops connectedness depends on maintaining trust by providing satisfying information (Thorsøe and Kjeldsen, 2016; Gugerell and Penker, 2020). Compared to CSCs, members in CSA and food co-ops have closer and more personal relationships with each other and with the farmers. This is consistent with studies that show how trustworthiness and feeling connected are sustained by personal encounters during physical activities, such as member voluntary work, decision-making, and organizing (Macias, 2008; Haney et al., 2015; Thorsøe and Kjeldsen, 2016; Papaoikonomou and Ginieis, 2017). In a study on food co-ops in Philadelphia (US), one of the members described this integrative moment of working toward a common goal as follows: *"[…] Having all these people work together for so long, that made [the cooperative] a closer community. […] there is no substitute for working together"* (Zitcer, 2015, 818). Members therefore identify less with a specific geographical area but with local sites. This form of place attachment is generated from the individual experiences of members within close, intimate relationships, interactions, and work (Schnell, 2013).

Similar to shareholders in CSCs, CSA as well as food co-op members pursue common goals. The most important motifs mentioned in the literature for CSA and food co-op members are local business support for an organic and seasonal production, access to healthy and high-quality food, protecting the environment, as well as regaining control over food supply. Many members also share a critical attitude toward non-sustainable farming practices and the dominance of conventional retailing (Cox et al., 2008; Brehm and Eisenhauser, 2008; Zoll et al., 2018; Carlson and Bitsch, 2019).

In contrast to the CSC shareholders, the members of CSA seek to be part of community life, which allows them to contact each other and to become personally acquainted with producers (Flora and Bregendahl, 2012; Pole and Gray, 2013). This, for instance, becomes apparent in a statement made by a member-owner of a food co-op in Indiana (US), who describes the initiative as "*a hub for people to meet, have conversations and interactions with people you know, [and that] enriches your life*" (Schrank, 2018, 165). Another common trait among CSA and food co-op members is that they advocate alternative food practices that prioritize social relationships over the dominance of market exchange and profit generation (Ostrom, 2007; Carlson and Bitsch, 2019). Their mission of food-decommodification involves replacing traditional grocery shoppers with citizens who are concerned about an appropriate food production and distribution system (Schnell, 2013; Boddenberg et al., 2017).

Table 4 summarizes the results on inclusiveness, involvement, and connectedness in the three types of social innovation.

Discussion and conclusion

Based on the results shown in Table 4, we will now discuss differences, similarities, and relationships between inclusiveness and social cohesion in food innovations. In subsection Difference in innovations' potential to bring about food system

TABLE 4 Inclusiveness and social cohesion in food innovations.

	Citizen shareholder company (CSC)	Community supported agriculture (CSA)	Food co-op
Inclusiveness	**Limited inclusiveness** **Socio-demographics**: More men, middle-to-old aged, high formal education, little ethnic diversity, above average income, reside in urban areas **Potential barriers**: Economic constraints, limited experience in investment and financial literacy **Inclusion strategies:** Moderate interest to address different middle class target groups	**(Rather) limited inclusiveness** **Socio-demographics:** More women, middle aged, high formal education, little ethnic diversity, above average income, reside in urban areas **Potential barriers**: Economic, spatial, and time constraints, limited experience in farming and community work, cultural barriers (e.g., individual food preferences) **Inclusion strategies:** Solidarity financing in bidding rounds: financial support based on what members can afford, redistributions, subsidizing	**(Rather) limited inclusiveness** **Socio-demographics:** More women, middle aged, high formal education, little ethnic diversity, above average income, reside in urban areas **Potential barriers**: (Partially) economic, spatial, and time constraints, cultural barriers, limited experience in community work, cultural barriers (e.g., individual food preferences) **Inclusion strategies:** Price discounts in exchange for voluntary labor
Involvement	**Low degree of active involvement** **Activities:** Limited motivation to organize events, low attendance rate at personal meetings, involvement is limited to shareholder rights (e.g., voting and attending annual meetings, access to financial information) **Showing solidarity toward producers:** Investing in social-ecological impact instead of expecting profit, sharing risks **Impacts:** Better understanding of the financial situation of sustainable agri-food businesses, moderate change in consumer behavior	**Low, medium, or high degree of involvement and proactive support:** (depending on the CSA model and member motivation) **Activities:** Organizing food pickups, assisting farm work, attending member meetings, plena, and bidding rounds, carrying out organizational tasks **Showing solidarity toward producers:** Covering farmer expenses in advance, sharing risks **Impacts:** Access to organic food and change in consumer behavior toward healthier and more sustainable habits, more experiential knowledge on organic and healthy produce and farming, consumer education (cooking skills, nutrition knowledge) and empowerment	**Low, medium, or high degree of involvement and proactive support:** (depending on the organization and size as well as member motivation) **Activities:** Organizing collective food purchases (food orders, delivery contracts, payment, food pickups), storing food, managing finances, attending meetings and plena, assuming organizational tasks **Showing solidarity toward producers:** Accepting "fair" supplier prices without negotiating **Impacts:** Access to organic food and change in consumer behavior toward healthier and more sustainable habits, more experiential knowledge of organic and healthy produce and organizing food retail, consumer education (cooking skills, nutrition knowledge) and empowerment
Connected-ness	**Connectedness despite limited personal relationships** **Almost no personal interaction, but high level of importance placed on extensive information and transparency.** **Identification with regional context** **Common goals:** Promoting small-scale and sustainable regional farming as well as establishing regional value-added chains and increasing biodiversity **Common criticism:** Tends toward conventional agriculture and policies	**Connectedness based on personal relationships** **Personal interactions and joint work** **Identification with local sites** **Common goals:** Supporting organic, seasonal, and local production, providing access to healthy and high-quality food, environmental protection, regaining control over food supply, seeking community life and food decommodification **Common criticism:** Critique of conventional farming	**Connectedness based on personal relationships** **Personal interactions and joint work** **Identification with local sites** **Common goals:** Supporting organic, seasonal, and local production, providing access to healthy and high-quality food, environmental protection, regaining control over food supply, seeking community life and food decommodification **Common criticism:** Critique of retail dominance

transitions, we address the role these innovations can play for food system transitions alongside the aspects of envisioned change, connectedness, organizational capabilities, and social learning. Finally, we draw attention to some methodological constraints of the study and provide a brief outlook on possible future research.

Inclusiveness and social cohesion in food innovations

The three studied food innovations seem to recognize the issue of their low or rather low level of inclusiveness, confirming the overall bias toward middle-class, white, and highly educated members (Hinrichs and Kremer, 2002). Reaching people with different socio-economic and cultural backgrounds, however, requires the implementation of strategies for inclusion.

CSA and food co-ops show various attempts at reducing economic barriers, for instance by means of bidding rounds, symbolic membership fees, and price discounts in exchange for work (Mert-Cakal and Miele, 2020). From our point of view, fostering a socio-cultural environment of inclusiveness is as important as overcoming economic barriers. Zitcer (2015) draws attention to unexperienced people becoming intimidated. Similarly, the findings for CSCs show that a lack of self-esteem and knowledge about financial investments, especially among women, could discourage people from subscribing. The initiatives could address these issues by using simplified language and building relationships that are open to feedback. More sensitive language also allows various perspectives to be captured based on socio-cultural differences (Kato, 2013). Thus, effective inclusion strategies should focus on open and differentiated forms of communication. Public relations can help organizations reach a wider audience by embracing a symbolic language that communicates information by using value laden messages and visual elements. Yet, the organizations' limited personal resources remain a key problem, which explains a tendency to focus on pragmatic recruitment strategies such as "word of mouth" or, in the case of CSCs, addressing well-known target groups.

Each of the three social innovations shows varying potential to reach higher inclusiveness. CSCs are faced with the challenge of shareholders being mainly incentivized by their ideological commitment, whereas the advantage of food co-ops and CSA is that they can additionally address the dietary needs of low-income consumers who are usually struggling to gain access to high-quality food (Guthman et al., 2006). On the other hand, becoming a shareholder does not necessarily require personal presence nor does it involve any time-consuming community activities, which makes involvement more attractive for those who are faced with heavy workloads (Pole and Gray, 2013). Since acquiring shares (financial participation) lies at the core of involvement in a CSC it is rather obvious that reaching out to low-income groups will remain difficult. However, shareholders with a diverse cultural and educational background could be addressed through differentiated communication strategies.

Another interesting point to consider is the link between social cohesion and membership numbers in food co-ops and CSA innovations. According to Papaoikonomou and Ginieis (2017), large groups self-managing food purchases, delivery, or farm work "*[. . .] cannot function on the basis of consensus and equal participation*" (62) due to rising transaction costs. Furthermore, for larger CSA farms, it becomes more difficult to facilitate direct encounters, which are essential for building close and trustworthy producer–consumer relationships (Haney et al., 2015). This lack of personal proximity might also lead to dissatisfied members that feel disconnected and are thus more likely to leave the community (Flora and Bregendahl, 2012).

In contrast, it seems to be less important for CSCs to provide spaces of encounter for identification processes, since they are mainly based on common interests and goals (Behrendt et al., 2022). As a consequence, CSCs are less affected by larger membership numbers as long as transparent information is available for trust building and maintaining connectedness (Thorsøe and Kjeldsen, 2016).

Moreover, there is a logical trade-off between maintaining social cohesion and increasing the inclusiveness of social innovations. As shown in the results, a homogenous community of people who "think alike" constitutes trust and a high degree of feeling connected, which reduces the risk of conflict and disintegrating tendencies. However, this homogeneity is associated with a low level of inclusiveness risks of excluding people from different socio-economic and socio-cultural groups. To address this trade-off, other aspects such as tolerance or the acceptance of diversity emerge as vital conditions for innovations that are growing and becoming more inclusive.

Following the definition by Schiefer and van der Noll (2017), active participation as a part of social cohesion involves more than pure membership since it also means taking responsibility and a longer-term commitment. In this sense, our comparison of the food innovations has shown that consumer involvement can take different forms. It can be measured as practical engagement, which is based on community activities, joint work, self-management, and organizational decision-making. As the CSC model demonstrates, however, another way for consumers to become involved can be through alignment with legal ownerships and financial contributions arising from solidarity, without further activities in management or the supported enterprises (Partzsch, 2018). We also want to draw attention to the fact that forms of consumer involvement in innovation processes also depend on the respective organizational context. Although involvement depends on a deliberate choice to become more or less engaged, consumer roles are, to a certain extent, a product of the organizational context which may—or may not—encourage different possibilities for active involvement.

Difference in innovations' potential to bring about food system transition

Our results have several implications for the transformational pathways of the studied food innovations and their potential for diffusion. All three social innovations offer alternative modes of food production and consumption that address tensions in the food regime and strive for radical change (Ingram et al., 2015).

The CSCs aim to bring about change in the finance sector, which so far has failed to adequately compensate the costs of adopting sustainable agriculture and food practices. The decision to invest money is based on a consideration of social and ecological services as well as the economic performance of the organic enterprises. In the long run, the goal is to compensate the enterprises financially for their efforts (Hiß, 2019). CSCs are promoting a food economy of the common good that serves societal needs but does not externalize the social-ecological costs of agri-food production. Currently, CSCs but also the supported enterprises, which act under competitive market conditions, are facing high financial pressure.

The diffusion capacity of CSCs therefore largely depends on convincing people to take on personal responsibility by financing eco-friendly and socially responsible food production. Although social and ecological benefits are seen (and communicated) as an increase in the shareholder value, it does not fully substitute expectations of financial return or other forms of revenue. As a consequence, the model is only attractive for those who are looking for ethical and sustainable but less profitable investments.

On the other hand, shareholders change conventional food supply structures with their investments but remain traditional end-users when it comes to their daily food practices. In this area, the other two social innovations of CSA and food co-ops show a more radical approach.

Members can take the role of supporters who are pro-actively engaged in self-organized community life. Gernert et al. (2018) stress the role that these alternative innovations play in steering fundamental "system change" instead of incremental regime adjustments. In contrast to the dominance of globalized agri-food systems, both innovations also build their own decentralized and self-governed infrastructures for food production and distribution. The producer r–consumer relationships in CSA and food co-ops are based on solidarity in terms of risk sharing and fair pricing: In contrast to the mainstream food economy, food is not primarily sold as a commodity for the purpose of profit generation but to satisfy basic needs and achieve producer–consumer connections. The diffusion of these innovations is usually challenged by finding and retaining motivated members who are willing to take an active part in building new community structures. There are, of course, exceptions. For instance, in food co-ops that have developed into larger corporations, members can become regular customers without changing their daily food practices.

As we have shown previously, CSA and food co-ops are typically based on more personal relationships and shared goals that are constitutive for their members' sense of connectedness. However, some studies reflect on how internal social proximities, specifically closely bonded relationships, might hamper the diffusion of innovations (Ingram et al., 2015; Gugerell and Penker, 2020). If innovations aim at influencing the incumbent regime, it is important to build wider networks that reach beyond their established community, for instance, through a collaboration with conventional food actors and institutions. Thus, it is crucial that innovations position themselves as alternatives without remaining isolated.

CSA and food co-ops are bound to local places, which corresponds with a physical co-presence that is required to carry out community duties (Gernert et al., 2018). Our empirical study on CSCs showed that geographical proximity also plays a considerable role for the shareholders and the management of such organizations. Regional attachment is an important argument that influences the initial investment decision of shareholders (Behrendt et al., 2022) and which explains the intention of CSCs to operate and develop within regions. Instead of attracting a higher number of members, it is important for the diffusion of all three social innovations that they multiply by setting up initiatives in more regions. For this purpose, the CSC network has established a nationwide structure in the form of the "Regionalwert-Impuls," which encourages the founding of new initiatives. In Germany, a similar role is played for CSA initiatives by the Network for Solidarity-Based Agriculture (2022).

CSCs make use of the current structures of the regime and adherences to financing and stock market regulations. Given that they take the legal form of a stock company, CSCs consist of formal relationships and well-defined roles, which builds a trustworthy environment but also sets clear expectations for involved actors and increases reliability (Jaeger-Erben et al., 2015; Wunder et al., 2019). Both of these aspects speak for an effective organization with high potential to enter the food regime. Due to the more democratic approaches in some of the CSA and food co-ops, the organizational capability depends on the efficiency of joint decision-making processes. At the same time, these innovations, which rely heavily on active member engagement, are at risk of overburdening their members who have only limited personal or financial resources.

Besides being responsible for attracting more shareholders, the CSC management also serves as an intermediate actor. In this role, they develop regional networks to create a common market for goods, while also reaching out to political institutions, civil society, and media representatives, which mobilizes additional (financial, human) resources and raises

public attention (Gernert et al., 2018). There is also a well-established CSA network in Germany, but similar national structures do not (yet) exist for food co-ops, which might deprive them of valuable support and funding (Celata and Sanna, 2018).

Finally, participation in these innovations goes hand in hand with different social learnings as an important element of sustainability transitions (see Section Social innovations in food system transitions). CSA and food co-ops aim to change practices and empower communities based on close producer–consumer relationships. As a consequence of these learning processes, they transition from passive consumers to active food citizens who have better knowledge of seasonal and healthy food (Renting et al., 2012; Opitz et al., 2017). The producers can also experiment with alternative growing and food processing practices that take socio-ecological implications into account. This is because they are less dependent on agricultural subsidies while also not operating under the mere maxim of economic profitability as long as CSA members provide the necessary financial means (Gruber, 2020). Learning processes also include experimenting with price negotiations between producers and consumers that address the question of who takes how much risk.

Besides incentivizing farming practices toward sustainability *via* sustainability reports, the CSC innovation also focuses on advocating structural shifts within the existing food system. Organic farmers are granted access to financial resources, which enables them to start or maintain businesses that can fill supply gaps along regional value chains (Böhm and Funcke, 2017; Celata and Sanna, 2018). This is also fostered by strengthening the contact between the supported enterprises in the CCS network. Through reading reports and staying informed, the shareholders learn that organic agriculture is more labor-intensive, which makes them understand the importance of monetizing the environmental and social benefits that the cooperating enterprises provide.

It should be noted that the validity of our interpretations in this section might be limited as empirical data were only collected for the CSCs, whereas all other findings are derived from a literature search. It is important to state that the literature we considered did not exclusively focus on questions regarding social cohesion and inclusiveness. It was also necessary for our analytical comparison to generalize from the organizational heterogeneity of CSA and food co-ops. Another shortcoming concerns our online survey, which did not reach the originally intended number of participations mainly due to missing contact data. This could lead to a bias in the sample and thus makes it less representative of the shareholders from all CSC innovations. Additional surveys among existing CSCs and other food innovations are required to strengthen the validity of our findings.

Conclusion

The aim of this paper was to examine how different social food innovations contribute to inclusiveness and social cohesion in the context of food system transitions. As shown, inclusiveness is not prioritized by most of the food innovations, which instead of being universal target particular groups. However, some of the CSA initiatives and food co-ops have deployed explicitly inclusive strategies. Moreover, the social innovations successfully foster solidarity and trustworthy relationships between consumers and food producers, but they do so this in different ways. While CSCs are service-oriented innovations with defined responsibilities and a focus on providing members with transparent information, food co-ops and CSA take a more community-based approach, relying on interpersonal relationships and civic engagement.

Food system transitions might need social innovations that complement each other by taking different change pathways and providing opportunities for people with different motivations and resources to become an active part in this process. As a result, future research could examine more systematically the complementary potential of these but also further social agri-food innovations and encourage better cooperation to jointly achieve greater impact.

Based on our findings, this paper uncovers some policy implications at the national but also EU level regarding support for these social innovations and thereby increasing opportunities for the inclusion and participation of diverse population groups.

More generally, there is an urgent need to reconsider current policies on agricultural finance. Transition toward more sustainable agriculture enables an economy that provides sufficient monetary incentives for enterprises to produce socio-ecological value and contribute to rural development instead of maximizing individual profits. At the same time, market prices would need to reflect the true costs of food production. This would make it easier for sustainable enterprises to operate profitably. Consequently, alternative financing models such as CSCs might eventually no longer be necessary.

Regional programs could promote more cooperation in sustainable food value chains with a particular focus on the better integration of small-scale producers. A good example of the institutionalization of these efforts is the recently implemented "value chain management" program, which is funded by the "Bundesprogramm Ökologischer Landbau (the German government's federal program for organic farming)" to promote the development of the German organic food sector. This management scheme focuses on supporting the establishment of regional value chains, which creates the potential for regional job opportunities, increased income, and stable rural communities.

All three social innovations depend on more active support, primarily from local or regional authorities, such as greater

recognition of the positive impacts they have on regional economies and their potential to revitalize rural areas and stimulate community development. Municipal governments could support this by providing easy-to-access information about the social innovations and built partnerships among local stakeholders for the purpose of reaching wider audiences. Since many of these social innovations struggle to be able to acquire sufficient land, municipal governments might also consider helping them to access public farmland. Supporting these social innovations in becoming more inclusive and cohesive remains an important task that requires concrete action. Recommendations refer to the support of community-building activities, broad opportunities for participation, and appropriate communication strategies that address people with diverse interests and backgrounds.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author/s.

Ethics statement

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. The patients/participants provided their written informed consent to participate in this study.

Author contributions

BH and MS contributed to the conception of the research design, edited, and revised the text. BH was responsible for data collection, analysis, and prepared the initial draft for the manuscript under supervision of MS. All authors contributed to manuscript revision, read, and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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References

Allen, J. E., Rossi, J., Woods, T. A., and Davis, A. F. (2017). Do Community Supported Agriculture programmes encourage change to food lifestyle. *Int. J. Agric. Sustain.* 15, 70–82. doi: 10.1080/14735903.2016.1177866

Behrendt, G., Peter, S., Sterly, S., and Häring, A. M. (2022). Community financing for sustainable food and farming: a proximity perspective. *Agri. Hum. Values*. 10, 1–13. doi: 10.1007/s10460-022-10304-7

Blättel-Mink, B., Boddenberg, M., Gunkel, L., Schmitz, S., and Vaessen, F. (2017). Beyond the market-New practices of supply in times of crisis: The example community-supported agriculture. *Int. J. Consum. Stud.* 41, 315–421. doi: 10.1111/ijcs.12351

Bock, B. (2012). Social innovation and sustainability; how to disentangle the buzzword and its application in the field of agriculture and rural development. *Agric. Econ.* 114, 57–63. doi: 10.7896/j.1209

Boddenberg, M., Frauenlob, M. H., Gunkel, L., Schmitz, S., Vaessen, F., and Blättel-Mink, B. (2017). "Solidarische Landwirtschaft als innovative Praxis – Potenziale für einen sozial-ökologischen Wandel," in *Soziale Innovationen für nachhaltigen Konsum. Wissenschaftliche Perspektiven, Strategien der Förderung und gelebte Praxis,* eds. M. Jaeger-Erben, J. Rückert-John and M. Schäfer (Wiesbaden: Springer VS), 125–149. doi: 10.1007/978-3-658-16545-1_6

Böhm, M., and Funcke, S. (2017). *Die Regionalwert AG als Beispiel eines erfolgreichen regionalen Unternehmensnetzwerkes. Ein Working Paper im Rahmen des Projekts "Regionale Transformation durch sozial-ökologisch handelnde Unternehmen (Regio TransKMU)".* Zentrum für Erneuerbare Energien, Freiburg. Available online at: file:///C:/Users/hennchen/Downloads/Boehm_Funcke_2017_RWAG_WorkingPaper.pdf (accessed November 14, 2022).

Brehm, J. M. and Eisenhauser, B. W. (2008). Motivations for participating in community-supported agriculture and their relationship with community attachment and social capital. *J. Rural Soc. Sci.* 23, 94–115. Available online at: https://egrove.olemiss.edu/jrss/vol23/iss1/5

Brunori, G., Ross, A., and Malandrin, V. (2010). Co-producing Transition: Innovation Processes in Farms Adhering to Solidarity-based Purchase. *Int. J. Social. Agric. Food* 18, 28–53.

BZfE (2020). Bundeszentrum für Ernährung. Foodcoops:Bio, fair und regional – geht auch mit kleinem Geldbeutel. Available online at: https://www.bzfe.de/nachhaltiger-konsum/einkaufsorte-finden/foodcoops/ (accessed April 5, 2022).

Caraher, M., Smith, J., and Machell, G. (2014). To co-operate or not co-operate: a case study of food co-ops in England. *J. Co-oper. Stud.* 47, 6–19.

Carlson, L., and Bitsch, V. (2019). Applicability of transaction cost economics to understanding organizational structures in solidarity-based food systems in Germany. *Sustainability* 11, 1095. doi: 10.3390/su11041095

Celata, F., and Sanna, V. S. (2018). A multi-dimensional assessment of the environmental and socioeconomic performance of community-based sustainability initiatives in Europe. *Reg. Environ. Change* 19, 939–952. doi: 10.1007/s10113-019-01493-9

Chan, J., To, H. P., and Chan, E. (2006). Reconsidering social cohesion: developing a definition and analytical framework for empirical research. *Soc. Indic. Res.* 75, 273–302. doi: 10.1007/s11205-005-2118-1

Cone, C. A., and Myhre, A. (2000). Community-supported agriculture: a sustainable alternative to industrial agriculture? *Hum. Organ.* 59, 187–197. doi: 10.17730/humo.59.2.715203t206g2j153

Cox, R., Holloway, L., Venn, L., Dowler, L., Hein, J. R., Kneafsey, M., et al. (2008). Common ground? Motivations for participation in a community-supported agriculture scheme. *Local Environ.* 13, 203–218. doi: 10.1080/13549830701669153

DeLin, L., and Ferguson, A. E. (1999). Is This a Women's Movement? The relationship of gender to community-supported agriculture in michigan. *Hum. Organ.* 58, 190–200. doi: 10.17730/humo.58.2.lpk17625008871x7

Destatis (2022). Statistisches Bundesamt. Available online at: https://www.destatis.de/DE/Themen/Gesellschaft-Umwelt/Bevoelkerung/_inhalt.html (accessed September 9, 2022).

Destatis. (2019). Statistisches Bundesamt. *Statistisches Jahrbuch*. Deutschland und Internationales. Wiesbaden.

Diekmann, M., and Theuvsen, L. (2019). Soziale nachhaltigkeit durch community supported agriculture. Hält das Konzept was es verspricht? *SuN*. 5, 93–110.

Dragolov, G., Ignácz, Z. S., Lorenz, J., Delhey, J., Boehnke, K., and Unzicker, K. (2016). *Social Cohesion in the Western World. What Holds Societies Together: Insights from the Social Cohesion Radar. 1st ed.* Cham: Springer International Publishing. doi: 10.1007/978-3-319-32464-7

Edelmann, H., Quiñones-Ruiz, X. F., and Penker, M. (2019). Analytic framework to determine proximity in relationship coffee models. *Sociol. Ruralis* 60, 458–481. doi: 10.1111/soru.12278

FAO (2017). Food and Agriculture Organization of the United Nations. Strategic work of FAO for Inclusive and Efficient Food Systems. Available online at: http://www.fao.org/3/a-i6627e.pdf (accessed November 14, 2022).

Flora, C., and Bregendahl, C. (2012). Collaborative community-supported agriculture: balancing community capitals for producers and consumers. *Int. J. Soc. Agr. Food*. 19, 329–346.

Fonte, M. (2013). Food consumption as social practice: Solidarity Purchasing Groups in Rome, Italy. *J. Rural. Stud.* 32, 230–239. doi: 10.1016/j.jrurstud.2013.07.003

Forbes, C. B., and Harmon, A. H. (2008). Buying into Community Supported Agriculture: Strategies for Overcoming Income Barriers. *J. Hunger Environ. Nutr.* 2, 65–79. doi: 10.1080/19320240801891479

Fritz, J., and Kaphengst, T. (2020). Regionalwert-Bericht 2020. Regionalwert AG Berlin-Brandenburg. Available online at: https://www.regionalwert-berlin.de/fileadmin/Downloads/Aktionaer-Infos/Regionalwert-Bericht.pdf (accessed November 14, 2022).

Galt, R. E., Bradley, K., Christensen, L., Fake, C., Munden-Dixon, K., Simposon, N., et al. (2016). What difference does income make for Community Supported Agriculture (CSA) members in California? Comparing lower-income and higher-income households. *Agric. Hum. Values* 34, 435–452. doi: 10.1007/s10460-016-9724-1

Gernert, M., El Bilali, H., and Strassner, C. (2018). Grassroots initiatives as sustainability transition pioneers: implications and lessons for urban food systems. *Urban Sci* 2, 23. doi: 10.3390/urbansci2010023

Gothe, S. (2018). Die Region als Wertschöpfungsraum," in *Über die neue Rolle der Verbraucherinnen und Verbraucher bei der regionalen Versorgung mit Lebensmitteln*. Kritischer Agrarbericht 310–323.

Gruber, S. (2020). *Bewältigungsstrategien alternativen Wirtschaftens. Wertrationalität und soziale Einbettung am Beispiel Solidarischer Landwirtschaft*. Baden-Baden: Nomos. doi: 10.5771/9783748909194

Gugerell, C., and Penker, M. (2020). Change agents' perspectives on spatial–relational proximities and urban food niches. *Sustainability* 12, 2333. doi: 10.3390/su12062333

Guthman, J., Morris, A. W., and Allen, P. (2006). Squaring farm security and food security in two types of alternative food institutions. *Rural Sociol.* 71, 662–684. doi: 10.1526/003601106781262034

Haney, J. M., Ferguson, M. D., Engle, E. W., Wood, K., Olcott, K., Luloff, A. E., et al. (2015). Defining the "C" in community supported agriculture. *Int. J. Agric. Sustain.* 5, 27–43. doi: 10.5304/jafscd.2015.053.009

Heyland, S. (2017). *Exploring cultures and practices of community supported agriculture and slow food in Germany* (Master's thesis). Wageningen University, Wageningen, Netherlands. Available online at: https://edepot.wur.nl/424930 (accessed November 14, 2022).

Hibbert, S., Piacentini, M., and Dajani, H. A. (2001). Understanding volunteer motivation for participation in a community-based food cooperative. *Int. J. Nonprofit Volunt. Sect. Mark.* 8, 30–42. doi: 10.1002/nvsm.199

Hinrichs, C., and Kremer, K. S. (2002). Social inclusion in a midwest local food system project. *J. Poverty* 6, 65–90. doi: 10.1300/J134v06n01_04

Hinrichs, C. C. (2014). Transitions to sustainability: a change in thinking about food systems change? *Agric. Hum. Values* 31, 143–155. doi: 10.1007/s10460-014-9479-5

Hiß, C. (2019). "Regionalwert AG Bürgeraktiengesellschaft-Zivilgesellschaftliches Unternehmertum zur Entwicklung von regionaler Ernährungssouveränität", in *Transformative Unternehmen und die Wende n der Ernährungswirtschaft,* eds. I. Antoni-Komar, C. Kropp, N. Paech and R. Pfriem (Marburg: Metropolis) 221–246.

Howaldt, J., and Schwarz, M. (2010). *Social Innovation: Concepts, research fields and international trends*. TU-Dortmund.

IFPRI. (2020). International Food Policy Research Institute. *Building Inclusive Food Systems. Global Food Policy Report. 2020 Global Food Policy Report: Building Inclusive Food Systems.* Washington, DC. doi: 10.2499/9780896293670

Ingram, J., Maye, D., Kirwan, J., Curry, N., and Kubinakova, K. (2015). Interactions between niche and regime: an analysis of learning and innovation networks for sustainable agriculture across Europe. *J. Agric. Educ. Ext.* 21, 55–71. doi: 10.1080/1389224X.2014.991114

Jaeger-Erben, M., Rückert-John, J., and Schäfer, M. (2015). Sustainable consumption through social innovation: a typology of innovations for sustainable consumption practices. *J. Cleaner Prod.* 108, 784–798. doi: 10.1016/j.jclepro.2015.07.042

Katchova, A., and Woods, T. (2012). "Food Cooperatives' Innovations and System Dynamics in Local Food Networks", in *Proceedings in System Dynamics and Innovation in Food Networks* 173–185.

Kato, J. (2013). Not just the price of food: challenges of an urban agriculture organization in engaging local residents. *Sociol. Inq.* 83, 369–391. doi: 10.1111/soin.12008

Kirwan, J., Ilbery, B., Maye, D., and Carey, J. (2013). Grassroots social innovations and food localisation: An investigation of the Local Food programme in England. *Glob. Environ. Change.* 23, 830–837. doi: 10.1016/j.gloenvcha.2012.12.004

Knupfer, A. M. (2013). *Food Co-ops in America: Communities, Consumption, and Economic Democracy*. London: Cornell University Press. doi: 10.7591/9780801467714

Köhler, J., Geels, F. W., Kern, F., and Markard, J. (2019). An agenda for sustainability transitions research: State of the art and future directions. *Environ. Innov. Soc. Transit.* 31, 1–32. doi: 10.1016/j.eist.2019.01.004

Kropp, C., and Müller, C. (2018). Transformative economies in the urban food movement: two case studies from Leipzig and Munich. *Z. Wirtsch.* 62, 187–200. doi: 10.1515/zfw-2017-0007

Kuckartz, U., Ebert, T., Rädiker, S., and Stefer, C. (2009). *Evaluation online Internetgestützte Befragung in der Praxis*. Wiesbaden: VS Verlag für Sozialwissenschaften.

Little, R., Maye, D., and Ilbery, B. (2010). Collective purchase: moving local and organic foods beyond the niche market. *Environ. Plan A.* 42, 1797–1813. doi: 10.1068/a4262

Loorbach, D., Frantzeskaki, N., and Avelino, F. (2017). Sustainability transitions research: transforming science and practice for societal change. *Annu. Rev. Environ. Resour*. 42, 599–626. doi: 10.1146/annurev-environ-102014-021340

Macias, T. (2008). Working toward a just, equitable, and local food system: the social impact of community-based agriculture. *Soc. Sci. Q.* 89, 1086–1101. doi: 10.1111/j.1540-6237.2008.00566.x

Markow, K., Booth, S., Savio, S., and Coveney, J. (2016). Improving access to community-based food systems: Comparing perspectives of low socioeconomic individuals and food system representatives. *Nutr. Dietet.* 73, 19–27. doi: 10.1111/1747-0080.12153

Mert-Cakal, T., and Miele, M. (2020). 'Workable utopias' for social change through inclusion and empowerment? Community supported agriculture (CSA) in Wales as social innovation. *Agric. Hum. Values* 37, 1241–1260. doi: 10.1007/s10460-020-10141-6

Mills, M., van de Bunt, G., and de Bruijn, J. (2006). Comparative researchpersistent problems and promising solutions. *Int. Sociol.* 21, 619–631. doi: 10.1177/0268580906067833

Moulaert, F., Mehmood, A., MacCallum, D., and Leubolt, B. (2017). *Social Innovation as a Trigger for Transformations. The Role of Research*. European Commission: Brussels.

Network for Solidarity-Based Agriculture (2022). Bestehende Solawis. Available online at: https://www.solidarische-landwirtschaft.org/solawis-finden/auflistung/solawis (accessed April 5, 2022).

Opitz, I., Specht, K., Piorr, A., Siebert, R., and Zasada, I. (2017). Effects of consumer-producer interactions in alternative food networks on consumers' learning about food and agriculture. *Morav. Geogr. Rep.* 25, 181–191. doi: 10.1515/mgr-2017-0016

Ostrom, M. R. (2007). "Community Supported Agriculture as an Agent of Change Is It Working? ", in *Remaking the North American food system. Strategies for sustainability,* eds. C. C. Hinrichs and T. A. Lyson (Lincoln: University of Nebraska Press) 99–121.

Papaoikonomou, E., and Ginieis, M. (2017). Putting the farmer's face on food: governance and the producer–consumer relationship in local food systems. *Agric. Hum. Values* 34, 53–67. doi: 10.1007/s10460-016-9695-2

Partzsch, L. (2018). "Food localization and agency. The cases of Regionalwert AG and Luzernenhof in Freiburg, Germany," in *Localizing Global Food Short Food Supply Chains as Responses to Agri-Food System Challenges,* eds. A Kalfagianni, and S. Skordili, (Routledge) 55–70. doi: 10.4324/9780429449284-5

Pole, A., and Gray, M. (2013). Farming alone? What's up with the "C" in community supported agriculture. *Agric. Hum. Values* 30, 85–100. doi: 10.1007/s10460-012-9391-9

Preiss, P., Charão-Marques, F., and Wiskerke, J. (2017). Fostering sustainable urban-rural linkages through local food supply: a transnational analysis of collaborative food alliances. *Sustainability*. 9, 1155. doi: 10.3390/su9071155

Putnam, R. D. (2007). E Pluribus Unum: Diversity and Community in the Twenty-first Century. The 2006 Johan Skytte Prize Lecture. *Scan. Polit. Stud.* 30, 137–174. doi: 10.1111/j.1467-9477.2007.00176.x

Regionalwert AG Berlin-Brandenburg. (2022). Available online at: https://www.regionalwert-berlin.de/ (accessed November 9, 2022).

Regionalwert AG Rheinland. (2022). Available online at: https://www.regionalwert-rheinland.de/partnerbetriebe/ (accessed November 9, 2022).

Regionalwert Impuls. (2022). Available online at: https://regionalwert-impuls.de/ (accessed November 9, 2022).

Renting, H., Schermer, M., and Rossi, A. (2012). Building Food Democracy: Exploring Civic Food Networks and Newly Emerging Forms of Food Citizenship. *Int. J. Sociol. Agric. Food*. 19, 289–307.

Rosol, M. (2020). On the significance of alternative economic practices: reconceptualizing alterity in alternative food networks. *Econ. Geogr.* 96, 52–76. doi: 10.1080/00130095.2019.1701430

Schiefer, D., and van der Noll, J. (2017). The essentials of social cohesion: a literature review. *Soc. Indic. Res.* 132, 579–603. doi: 10.1007/s11205-016-1314-5

Schlicht, S., Volz, P., Weckenbrock, P., and Le Gallic, T. (2012). *Community Supported Agriculture: An overview of characteristics, diffusion and political interaction in France, Germany, Belgium and Switzerland.* Die Agronauten.

Schnell, S. M. (2013). Food miles, local eating, and community supported agriculture: putting local food in its place. *Agric. Hum. Values* 30, 615–628. doi: 10.1007/s10460-013-9436-8

Schrank, Z. (2018). Putting money where my mouth is: motivations and experiences among food co-op members. *J. India. Acad. Soc. Sci.* 21, 153–170. Available online at: https://digitalcommons.butler.edu/jiass/vol21/iss1/46 (accessed November 14, 2022).

Schulz, M., Mack, B., and Renn, O. (2012). *Fokusgruppen in der empirischen Sozialwissenschaft*. Wiesbaden: VS Verlag für Sozialwissenschaften. doi: 10.1007/978-3-531-19397-7

Seyfang, G., and Longhurst, N. (2016). What influences the diffusion of grassroots innovations for sustainability? Investigating community currency niches. *Technol. Analy. Strat. Manage.* 28, 1–23. doi: 10.1080/09537325.2015.1063603

Smith, A., and Seyfang, G. (2013). Constructing grassroots innovations for sustainability. *Glob. Environ. Change*. 23, 827–829. doi: 10.1016/j.gloenvcha.2013.07.003

TAGWERK (2022). Wofür TAGWERK steht. Available online at: https://www.tagwerkcenter.net/ueber-uns (accessed April 12, 2022).

Talmage, C., and Knopf, R. C. (2017). "Rethinking diversity, inclusion, and inclusiveness: The quest to better understand indicators of community enrichment and well-being", in *New dimensions in community well-being*, eds. P. Kraeger, S. Cloutier, and C. Talmage (Cham: Springer), 7–27. doi: 10.1007/978-3-319-55408-2_2

Thorsøe, M., and Kjeldsen, C. (2016). The constitution of trust: function, configuration and generation of trust in alternative food networks. *Sociol. Ruralis* 56, 157–175. doi: 10.1111/soru.12082

Volz, P., Weckenbrock, P., Cressot, N., and Parot, J. (2016). Overview of Community Supported Agriculture in Europe. Available online at: http://urgenci.net/the-csa-research-group/ (accessed November 14, 2022).

Wunder, S., Albrecht, S., Porsch, L., and Öhler, L. (2019). *Kriterien zur Bewertung des Transformationspotentials von Nachhaltigkeitsinitiativen*. Abschlussbericht. Umweltbundesamt: Dessau-Roßlau.

Zitcer, A. (2015). Food co-ops and the paradox of exclusivity. *Antipode* 47, 812–828. doi: 10.1111/anti.12129

Zoll, F., Specht, K., Opitz, I., Siebert, R., Piorr, A., and Zasada, I. (2018). Individual choice or collective action? Exploring consumer motives for participating in alternative food networks. *Int. J. Consum. Stud.* 42, 101–110. doi: 10.1111/ijcs.12405

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Why do people participate in grassroots sustainability initiatives? Different motives for different levels of involvement

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Grassroots sustainability initiatives experiment with alternative ways of consumption and are promising agents for fostering pro-environmental behavior change. However, sustainability initiatives depend on high levels of volunteering and collective action. With the present research we aimed to better understand why people participate in sustainability initiatives and whether doing so is an expression of a broader set of pro-environmental behaviors. We tested the predictive importance of various motivational factors derived from grassroots innovation research, the theory of planned behavior, and theories on collective action, using data from a cross-sectional factorial survey of participants in several sustainability initiatives in Switzerland ($N = 180$). Our results revealed different motivational patterns depending on the level of involvement. The intention to use services and offers of sustainability initiatives (low level of involvement) was best explained by favorable attitudes toward participation and perceived behavioral control, while the intention to volunteer for such initiatives (high level of involvement) was additionally based on strong social identity and a high belief in participative efficacy. Our results also revealed that participation in sustainability initiatives concurs with those other private-sphere pro-environmental behaviors that are most similar to the initiatives' activities. We conclude from our results that the divergence in motivational factors between users and volunteers might pose a challenge to the success of sustainability initiatives and therefore deserves greater attention in future research.

KEYWORDS

sustainable consumption, theory of planned behavior, social identity, collective action, pro-environmental behavior, ecological self-identity

1. Introduction

Respecting the carrying capacities of our ecosystems requires a comprehensive transformation of our prevailing consumption and productions systems (Bengtsson et al., 2018). Sustainability initiatives are promising change agents; they experiment with social innovations for sustainable consumption, namely with new production and consumption patterns that respect the planetary boundaries and strive for social justice (Seyfang and Smith, 2007; Seyfang, 2009; Cohen, 2015; Longhurst et al., 2016; Avelino et al., 2019).

In this article, we use the term "grassroots sustainability initiatives" to summarize a broad range of community-led initiatives whose primary aim is to help solve our societies' sustainability problems and which arise on the initiative of committed individuals or groups of people experimenting with new patterns of consumption and production. Sustainability initiatives can be organized in loose, informal groups, in associations and cooperatives, or even in companies, which, however, put their contribution to society before their economic profits. Energy and sharing communities, repair cafés, transition town movements, and community supported agriculture (CSAs) are just a few examples of this phenomenon. Grassroots sustainability initiatives search for new solutions and forms of consumption that are more socially and environmentally compatible, and, in doing so, shape sustainable narratives and visions. Common to them all is a strong reliance on volunteer work and personal commitment, without which many of them would not survive.

Many grassroots sustainability initiatives have emerged in the last decades, and the rise of these movements has increasingly attracted the attention of sustainability social science and consumption research: Frantzeskaki et al. (2017) found more than a thousand related scientific publications from 2010 to 2016. Despite this growing interest, scientific focus on actions that take place at an individual level is recent and of a mainly conceptual and descriptive character (e.g., Jaeger-Erben et al., 2015; Grabs et al., 2016; Maschkowski et al., 2017). On the other hand, research on pro-environmental behavior offers reliable theories and models of individual behavior and consumption but has only rarely expanded these insights into concepts of collaborative consumption and collective action (e.g., Fritsche et al., 2018; Jans, 2021). In our view, an integration of these existing research avenues—the typologies, frameworks, and case studies provided by social science research on grassroots sustainable consumption innovations, and the perspective of social and environmental psychology centered on individual pro-environmental behavior and collective action—has the potential to provide novel insights into how sustainability initiatives successfully emerge and become established.

The present study constitutes a step in this integrative direction. On the one hand, we aimed to better understand why people participate in sustainability initiatives, as a high degree of commitment and involvement is a key requirement for these initiatives' survival. On the other hand, we were interested in gaining a better understanding of whether such engagement is an expression of a broader sustainable lifestyle. Potential spillover effects of engagement in sustainability initiatives to broader areas of everyday action is one way in which sustainability initiatives can contribute to natural resource conservation beyond their core activities. Our integrative approach enabled us to understand the factors explaining different degrees of participative involvement in sustainability initiatives and the effects of such an involvement on consumption behavior. With our findings, we contribute to a better understanding of the potential of sustainability initiatives to foster natural resource conservation. By integrating the previously rather independent strands of research, our study also helps to integrate and advance the sustainability initiatives research field in a novel way.

2. Conceptual background

Various strands of research, largely independent to date, provide conceptual foundations for a better understanding of the motives for participation in sustainability initiatives. In this chapter, we outline three conceptual strands relevant to this study. First, we introduce research on grassroots movements and social innovation in sustainable consumption (section 2.1). Second, we derive insights from research in environmental psychology. This research can be divided into approaches that focus on explaining individual pro-environmental behavior, on the one hand (section 2.2), and approaches that explain collective environmental behavior, on the other (section 2.3). Often, a distinction is made between private-sphere and public sphere behavior (Stern, 2000; Ertz et al., 2016). Private-sphere behavior includes purchases, use and disposal of goods and services in everyday private life. Corresponding behavioral decisions have a direct influence on the state and availability of natural resources. Public sphere behavior, on the other hand, includes engagement to change the contextual conditions of behavioral decision, for example by environmentalist activism or more passive public behavior such as voting. Thus, public sphere behavior contributes indirectly to the protection of natural resources by shaping more favorable contexts for private-sphere behavior decisions. While previous research on pro-environmental behavior (section 2.2) primarily takes a perspective on private-sphere pro-environmental behavior, the research strands on collective action (section 2.3) tend to focus on public sphere behavior.

2.1. A grassroots innovation research perspective on participation in sustainability initiatives

Participation is a key factor for the survival of sustainability initiatives. In contrast to market-oriented innovations, grassroots initiatives rely heavily on the voluntary engagement of their members to provide alternatives to prevailing consumption and production patterns (Geels, 2019). Many of these initiatives are not financially self-supporting, at least at the beginning, and are thus unable to compensate all of their members' efforts on a financial basis. Possible financial income stems from the provision of services and products. However,

this requires a certain number of users who are willing to purchase these alternative offers instead of conventional (and thus usually more competitive) ones (Hossain, 2018). In other words, participation is central to initiatives in two respects: on the one hand, *via* the idealistic commitment of a core group of volunteers, and on the other hand, *via* the interest and commitment of a broader group of users.

Case studies on grassroots and social innovations in the field of sustainable consumption emphasize that participants in sustainability initiatives have diverging motives and expectations (e.g., Moraes et al., 2012; Dubois et al., 2014; Grabs et al., 2016; Martin and Upham, 2016; Schor, 2016; Maschkowski et al., 2017). This research characterizes co-founders and volunteers as strongly committed people who have transcendent values and are driven by a high problem awareness of how our current consumption habits are harming the environment. These are strong motivational forces for the considerable engagement and voluntary work required, in particular during the founding phase of an initiative. Through their engagement, people search for new, collective ways of overcoming the impotence of private-sphere behavior change by challenging the structural conditions that impede sustainable behavior, and by providing and exemplifying alternative consumption practices. By contrast, the motives of the customers, or users of the offers and services of sustainability initiatives, have been described as more diverse. Social connection and affiliation—as well as personal hedonistic reasons, such as experiences and enjoyment—appear to be just as important as societal and ecological values or problem awareness. Such diverging motives and expectations between the people involved may, however, challenge the success of initiatives (Dubois et al., 2014; Seyfang and Longhurst, 2016) or even provoke their failure (Fitzmaurice and Schor, 2018).

People have different reasons for taking part in sustainability initiatives. At the same time, the various initiatives also address different motivations. Jaeger-Erben et al. (2015, 2017) have offered a systematic comparison and characterization of sustainability initiatives from a social innovation perspective. They distinguish between five types of sustainability initiatives, each addressing different motivational aspects. The first type, so called "do-it-together" innovations, are mainly characterized by a high degree of communality and, among the members, strongly shared alternative values and a high degree of personal engagement and social identification with the initiatives. Examples of "do-it-together" innovations are urban gardening projects, ecovillages, or community supported agriculture (CSA). The second type, so called "do-it-yourself" innovations such as "repair cafés" or fablabs, focuses on providing new (or lost) competences and offering facilities for self-production or repairing of products and assets. The third type, "sharing communities" such as collaborative consumption platforms or time banks, are characterized as communally organized new social settings that facilitate swapping and sharing. The fourth type, "utility-enhancing consumption," such as car sharing or bike sharing, mainly provide new or facilitated "material settings" and options for action, which improve the fit of the utility value of a product and the needs of the customer. Finally, the fifth type, "strategic consumption" innovations such as "buycotts" or "carrot mobs," are described as community creating, albeit more on an opportunity driven and short-term basis than the other innovation types.

Taken together, research on social and grassroots innovations suggests that different types of sustainability initiatives address different motivational factors. The initiatives may address personal or social benefits and values, offer social affiliation and communality, enhance competences, or provide and facilitate access to alternative material settings and thus foster perceived behavioral control. Moreover, the characteristics of an initiative that attract engaged volunteers may differ from those that attract users or customers.

2.2. A pro-environmental behavior research perspective on participation in sustainability initiatives

Sustainability initiatives provide new or facilitated ways of collaboratively consuming in ways that are less resource-intensive. From a behavior change perspective, participating in sustainability initiatives can therefore be conceptualized as a specific form of private-sphere pro-environmental behavior, which means that environmental psychological behavior-change theories may be informative in identifying motivational drivers. One of the most commonly used theories in this context is the theory of planned behavior (Ajzen, 1991; Fishbein and Ajzen, 2011). The theory of planned behavior describes three motivational factors that influence individual behavior intentions and reasoned behavior decisions, considering different aspects of expected costs and benefits: behavioral attitudes, subjective social norms, and perceived behavioral control. Originally proposed for a broad spectrum of (social) behaviors, the theory of planned behavior found frequent application in studies explaining pro-environmental behavior, as a stand-alone theory as well as combined with other predictors (for overviews, see, e.g., Bamberg and Möser, 2007; Klöckner, 2013).

Occasionally, the theory of planned behavior has been applied to the context of participation in sustainability initiatives. Roos and Hahn (2017b) for example explored predictors of participation in consumer and peer networks to borrow, rent, donate, swap, or buy used goods. They found that the intention to participate was mainly based on personal norms and attitudes and less on subjective social norms. Moreover, personal norms were related to strong altruistic and biospheric values, and positive attitudes resulted from

positive outcome expectations regarding cost savings, more efficient resource use, communality, as well as positive effects on the environment. Perceived behavioral control, the main factor explaining the implementation of the intention into behavior several weeks later, was affected by factors such as easy internet access, geographic proximity, and density of behavior opportunities. In another study, Barnes and Mattsson (2017) explored the effects of attitudes and subjective social norms on the intention to participate in car-sharing initiatives. They found that immediate positive outcome expectancies, such as expected usefulness and enjoyment, explained the intention to participate, while subjective social norms did not show any predictive power. Expected usefulness and enjoyment for their part depended on the level of perceived economic, social, and environmental benefits, as well the sense of belonging to the sharing community.

Thus, research on pro-environmental behavior suggests that considerations of personal costs and benefits, particularly in the form of attitudes and perceived behavioral control, may explain why people participate in specific sustainability initiatives.

2.3. A collective action research perspective on participation in sustainability initiatives

Making a sustainability initiative thrive often requires a much stronger commitment than simply using the offers and services provided. At least at the outset, many initiatives depend on the voluntary engagement of their members, who collectively complete the necessary work and organize meetings, events, etc. An understanding of participation in sustainability initiatives should thus go beyond individual behavior change theories. Promising additional insights are offered by research on activism, and collective action, which examines why people come together with like-minded others to collectively work toward broader societal transformation.

One of the roots of this research goes back to Klandermans (1997), who conceptualized three main motivational elements for getting involved in collective action. A first, instrumental, element involves the perception of a common problem, which manifests in a sense of injustice, a desire to change the adverse circumstances, and a conviction that change is possible (Klandermans, 2004). With regard to instrumental beliefs, Van Zomeren et al. (2008, 2013) highlighted the importance of participative efficacy beliefs. Participative efficacy encompasses the belief that one's own contribution to the collective will make a significant difference in terms of reaching the collective goals. The second motivational element is a process of collective identification with those suffering from the unjust situation and particularly with the group trying to change the disadvantageous circumstances (Klandermans, 2004). The third element, finally, is the need for expression or articulation of the injustice, that is, going into action as an expression of one's own ideology or moral conviction (Klandermans, 2004; Van Stekelenburg et al., 2009; Van Zomeren et al., 2012).

This previous work has been further developed by Fritsche et al. (2018), who proposed a theoretical framework on pro-environmental collective action, with a main emphasis on the relevance of social identity. According to this framework, individuals engage in collective action if they feel a strong coherence between their own self-identity and the group's norms, values, and goals, and if they identify strongly with the other group members. A second important predictor of collective action, according to this framework, is the belief in collective efficacy, that is, a belief that the collective engagement will successfully change the predominant unfavorable circumstances.

A few studies provide empirical evidence on the importance of these factors regarding participation in sustainability initiatives. For example, Bamberg and colleagues (Rees and Bamberg, 2014; Bamberg et al., 2015) found that the intention to engage in local climate protection initiatives depends on the strength of social identification with the collective, on beliefs in participative efficacy, on perceived behavioral control, and on negative emotions such as guilt. In a study by Schmitt et al. (2019), social identity was the most important predictor of environmental activism. Moreover, social identity was also associated with different private-sphere pro-environmental behaviors, with ecological self-identity being the more important predictor. A meta-analysis by Schulte et al. (2020) supports the notion that social identity is a main driver of participation in pro-environmental collective action. Finally, Jans and colleagues (Sloot et al., 2018; Jans, 2021) found that social identity with bottom-up pro-environmental initiatives—as well as factors such as values, personal norms, or environmental self-identity—explained participation in the initiatives, as well as in implementing various energy-saving measures in the household.

Thus, insights from social psychological research on collective action suggest that group-based processes (social identification, collective efficacy beliefs, and participative efficacy beliefs) may complement the more personal cost–benefit calculations introduced in the previous section when it comes to explaining participation in sustainability initiatives. The relative importance of the personal vs. collective factors might, however, vary depending on the degree of commitment and involvement with the initiative.

3. Hypotheses development and conceptual framework

The aims of the present research were two-fold. First, we strove for a better understanding of the motivational structure that underlies participation in sustainability initiatives. Thus, we were interested in (a) what attributes of different sustainability initiatives influence a willingness to participate, (b)

what psychological motives may explain such a willingness to participate, and (c) whether there exist possible differences in motives for different involvements of participation.

Second, we wanted to learn more about the interrelations between participation in sustainability initiatives and other private-sphere pro-environmental behaviors. Thus, we wanted to find out whether a relationship exists between participation in sustainability initiatives and other pro-environmental behaviors in private daily life.

To approach our first aim—explaining participation—we referred to different potential motivations put forward by the three research threads introduced in the previous section: First, based on the typology of Jaeger-Erben et al. (2015, 2017), we assumed that participants in sustainability initiatives are attracted by these initiatives' attributes. To varying degrees, the initiatives may address different values and benefits, offer social affiliation and communality, enhance competences, or provide access to alternative material settings. Thus, "do-it-together" initiatives are particularly strong in addressing altruistic and biospheric values; "do-it-yourself" initiatives enhance competences; "sharing communities" provide opportunities for social affiliation and community; and "utility enhancing" initiatives facilitate access to new material settings. In our study, we sought empirical evidence of this typology.[1] Based on the typology, we hypothesized:

> **H1:** Variation of four attributes of initiatives will explain behavioral intentions to participate; (a) social benefits (compared to personal benefits), (b) easy (compared to difficult) accessibility, (c) high (compared to low) encouragement of competences, and (d) high (compared to low) opportunities for communality enhance the intention to participate in sustainability initiatives.

Second, in accordance with the theory of planned behavior (and empirical evidence of Barnes and Mattsson, 2017; Roos and Hahn, 2017b), we assume that the intention to participate in sustainability initiatives depends on personal considerations, namely behavior attitudes, subjective social norms, and perceived behavioral control. In addition, according to research on collective action (and the empirical evidence of Van Zomeren et al., 2013; Rees and Bamberg, 2014; Bamberg et al., 2015; Sloot et al., 2018; Schmitt et al., 2019; Schulte et al., 2020; Jans, 2021) it also depends on collective motives and beliefs, namely pursuit of social identity and beliefs in collective and participative efficacy. Thus, we hypothesized:

> **H2:** Intentions to participate in sustainability initiatives are related to the level of (a) attitudes, (b) subjective social norm, (c) perceived behavioral control, (d) social identity, (e) collective efficacy beliefs, and (f) participative efficacy beliefs.

Finally, we assumed that the relative importance of personal and collective factors depends on the degree of involvement in the initiatives; engaged volunteers might more strongly emphasize collective motives than mere users/customers of the initiatives' offers and services. Thus, we assume that the motives of users (which correspond more to private-sphere behavior) differ from those of engaged volunteers (which is rather a public sphere behavior). In this sense, we hypothesized:

> **H3:** The factors of (a) attitudes, (b) subjective social norm, and (c) perceived behavioral control are more strongly related to the intention to use the initiatives' offers and services, whereas (d) social identity, (e) collective efficacy beliefs, and (f) participative efficacy beliefs are in stronger relation with the intention to voluntarily engage in initiatives.

Figure 1 presents a visual overview of the postulated conceptual framework model, and the three hypotheses.

Our second aim was more explorative. We wanted to learn more about the interrelations between participation in sustainability initiatives and other private-sphere pro-environmental behaviors, as well as the common underlying motivational structure. We built on studies positing that readiness for collective action is accompanied by high problem awareness, pro-environmental self-identity, strong efforts to save natural resources, and high levels of private-sphere behavior (e.g., Sloot et al., 2018; Tagkaloglou and Kasser, 2018; Schmitt et al., 2019). Other studies have found that public sphere behavior predicts private-sphere behavior (Liobikiene and Poškus, 2019), and that both, private-sphere as well as public sphere behavior is predicted by supportive attitudes (Ertz et al., 2016). Moreover, it has been found that individuals who engage in sustainability initiatives have lower overall carbon footprints than persons who do not engage in such initiatives (Vita et al., 2020). Qualitative and quantitative research suggests that engagement in sustainability initiatives reinforces underlying norms and attitudes (e.g., Signori and Forno, 2016; Roos and Hahn, 2017a), and thus strengthens engagement in other related pro-environmental behaviors. This is in line with theories on social identity, which emphasize that in-group dynamics may reinforce social identity and collective norms and values of the group members (e.g., Fritsche et al., 2018). In our preliminary qualitative study among participants in sustainability initiatives and corresponding umbrella organizations, we found ambiguous indications (Moser et al., 2018). While some of our interviewees believed that participating in sustainability initiatives reinforces problem awareness and norms, thus positively spilling over into behaviors in other consumption areas, others suspected that some

1 The fifth type of the typology, "strategic consumption," was not included in the present study, as the nature of participation in this type is much more short-term and spontaneous than for the other four types.

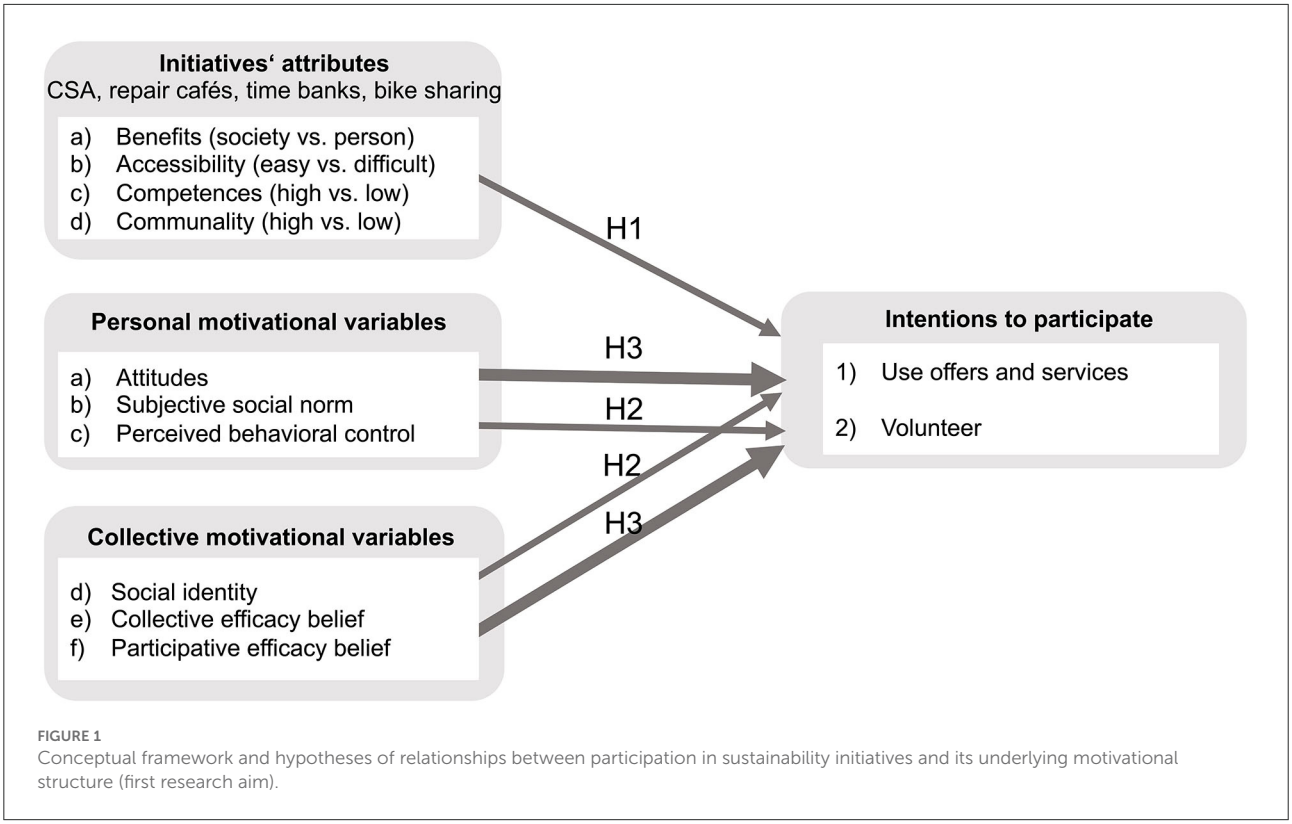

FIGURE 1
Conceptual framework and hypotheses of relationships between participation in sustainability initiatives and its underlying motivational structure (first research aim).

participants use their engagement in sustainability initiatives to excuse other, more environmentally harmful behaviors (such as air travel).

4. Methods

We tested our assumptions through a cross-sectional online survey of participants in various sustainability initiatives in the German-speaking part of Switzerland. The survey was part of a broader research project on Swiss civil-society initiatives and their contribution to sufficiency. Preceding work included a web search on existing initiatives in Switzerland, as well as qualitative interviews with founders, active members, and umbrella organizations (Moser et al., 2018). For the survey presented in this paper, we decided to focus on four different types of initiatives, based on the typology of Jaeger-Erben et al. (2015, 2017). The first are community supported agriculture (CSA) initiatives, which are examples of "do-it-together initiatives." Second, we chose to focus on bike sharing initiatives, which represent "utility enhancing initiatives." Third, we looked at repair cafés, which are typical examples of the "do-it-yourself" type. Fourth, we chose to assess time banks, which constitute special examples of "sharing communities" (see text footnote 1).

We intended to conduct the survey among individuals who have a connection to existing sustainability initiatives. In this sense, we did not aim to cover a representative sample of the Swiss population. Despite a growing interest in and number of sustainability initiatives, they still have to be considered a rare niche phenomenon; only a minority of people have experienced participation. Accordingly, we feared that a representative sample of the Swiss population would not cover enough variance in the answers on current participation. Therefore, we advertised the survey in various networks representing different types of initiatives, such as the association of Swiss repair cafés, the platforms of time banks and complementary currencies, and various community supported agriculture and bike sharing initiatives in Switzerland. In doing so, we aimed to include in our sample individuals showing different degrees of participation in various types of initiatives. Data were gathered in spring 2018. A total of 439 people visited the landing page, and 181 individuals (completion rate of 41.5%) gave their informed consent to participation, after having been guaranteed anonymity and informed on data protection and procedures. Filling in the questionnaire took 26 min on average. One person made subsequent use of their right to have their answers deleted, so that our analysis builds on $N = 180$. To appreciate their participation, at the end of the questionnaire participants were given the option to vote for an initiative of their choice to receive a donation of CHF 500 (equivalent to €416 at an exchange rate of 0.8366 on May 1, 2018). One of the community supported agriculture initiatives obtained the most votes and thus the donation.

4.1. Participants

The mean age of the 180 participants who entered our data analysis was 50.22 years (SD = 13.95 years); 36.1% were male. The sample was very highly educated, with 63.2% of our participants having a bachelor's, master's, or doctoral degree. A total of 74.4% reported they were (self-)employed; most of the 25.6% of non-working participants said they were retired. The median annual gross salary ranged between CHF 39,000 and 52,000/year. The average household size was 2.77 persons; a majority of 52.0% lived in urban residential areas with more than 10,000 inhabitants.

4.2. Survey design

Our online questionnaire contained standardized items on sociodemographic characteristics, pro-environmental motivations, the frequency of different pro-environmental behaviors, and the degree of current participation in different types of sustainability initiatives. Moreover, we embedded four different "vignettes," which were presented to the participants in a randomized order. Each vignette described one of the four types of sustainability initiatives: (a) a description of a community supported agriculture (CSA) initiative, representing "do-it-together" initiatives; (b) a description of a repair café, representing "do-it-yourself" initiatives; (c) a description of a time bank, representing a "sharing community" innovation; and (d) a description of a bike sharing initiative, representing a "utility enhancing consumption" initiative (cp. Figure 2). For each vignette, four different attributes, each containing two dimensions, were systematically varied. These were: (a) addressing personal (–) vs. societal (+) values and benefits; (b) describing accessibility to offers and services as difficult (–) vs. easy (+); (c) describing support in enhancing one's own competences as low (–) vs. high (+); and (d) describing opportunities for social affiliation and communality as low (–) vs. high (+). For the detailed wording of the different variants of the four vignettes, see Table 1 and Supplementary material A. Our procedure followed a "fractional factorial survey design" (Auspurg and Hinz, 2015). Factorial surveys contain short descriptions of hypothetical situations with systematically varied attributes ("vignettes"), with participants' reactions assessed on different evaluative scales. Factorial surveys thus combine survey methods with experimental design. Our design was "fractional" because we did not include all of the 4^2 potential attribute combinations. Rather, we chose a balanced confounded D-efficient design (following suggestions of Dülmer, 2016). This means that we used eight variants for each vignette, with minimal intercorrelation of the dimensions and interaction terms. Thus, each participant was presented with one (randomly chosen) of the eight potential variants for each of the four different vignettes. Each presentation was followed by an item set assessing participants' reactions (the items are described in more detail in the next section). This design allowed us to test for how the initiatives' systematically varied attributes affected participants' evaluations (Hypothesis 1). The vignettes' attributes were identified in preceding exploratory qualitative research (Moser et al., 2018) and passed technical pre-testing.

4.3. Measures

4.3.1. Appraisal of the different types of initiatives (vignettes)

To test our Hypotheses 1–3 related to our first aim—explaining the motivational structure that underlies participation in sustainability initiatives—the presentation of each vignette (i.e., each type of sustainability initiative) was followed by the same item set assessing participants' agreements with statements on psychological appraisals and participants' participation intentions. Agreement was assessed on an answer scale ranging from 1 = "Do not agree at all" to 5 = "Totally agree." Participation intentions were assessed in two ways (based on own formulations): First, the *intention to use offers and services* of the initiative described was assessed through three items ("I would want to try such an offer/service," "I can imagine using such an offer/service regularly in the future (e.g., taking out a subscription)," and "I would like to buy more products from such an offer in the future instead of in a supermarket." The three items showed a high reliability, with Cronbach's α ranging between 0.87 and 0.95 for all four types of initiatives, and the mean scores were used for the subsequent analysis. Second, we assessed the intention to engage in or volunteer for such an initiative (single item, own formulation: "I could imagine actively volunteering for such an initiative"). The motivational items assessed as exploratory variables after the presentation of each vignette were inspired by the ones used by Bamberg et al. (2015) and in our qualitative pre-study (Moser et al., 2018): For each type of sustainability initiative, we assessed a single item for *attitude* ("This initiative would significantly enrich my everyday life"), *perceived behavioral control* ("This initiative would be easily accessible to me"), *subjective social norm* ("People who are important to me would appreciate my participation in such an initiative"), *social identity* ("Taking part in such an initiative would be an important part of my being"), *collective efficacy belief* ("Such an initiative would significantly contribute to a sustainable society"), *and participative efficacy belief* ("My active participation would make an important contribution toward the initiative reaching its goals").

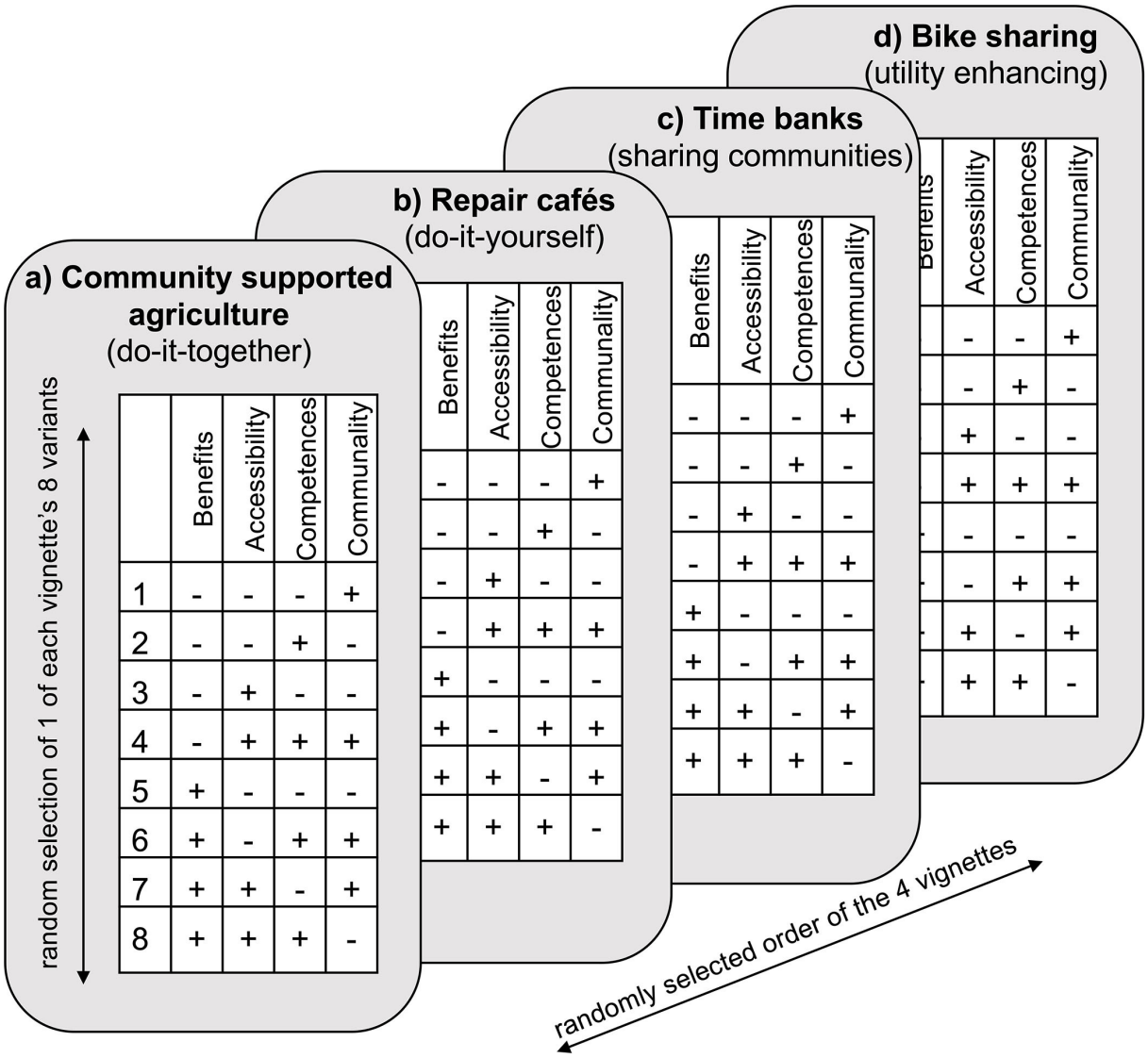

FIGURE 2
Illustration of the eight different variants of the four presented vignettes. **(a–d)** The four presented vignettes. (−)/(+) represent the two possible dimensions of each of the four attributes (benefits, accessibility, competences, communality). The dimensions were combined in 8 different variants for each of the four vignettes: Variant 1 containing (−) for benefits, accessibility, competences, and (+) for communality. Variant 2 containing (−) for benefits, accessibility, communality, and (+) for competences, etc. For the detailed wording of the dimensions, see Table 1 and Supplementary material A.

4.3.2. Current participation in sustainability initiatives

Current participation in different types of initiatives was assessed as explanatory variables with a view to explaining pro-environmental behavior. After being presented with the four vignettes, participants were asked to report on how often they participated in similar real-world initiatives. For each type of initiative, they were asked how often in the last 3 months they had (a) attended meetings and events, (b) actively used offers and services, and (c) volunteered (e.g., working for an association, organizing events or work inputs, etc.) (three items for each of the four types of initiatives, based on own formulations). We used an answer scale ranging from 1 (="never") to 5 (="every day"). The reliability of these three items was high, with Cronbach's $\alpha = 0.85$ for community supported agriculture, 0.87 for time banks, 0.90 for repair cafés, and 0.80 for bike sharing. The mean scores were used for the subsequent analysis.

TABLE 1 Wording for community supported agriculture (CSA) vignette (for the wordings of the other three vignettes see Supplementary material A).

Introduction		
This association is committed to the principles of community supported agriculture. Members choose from a wide range of organically produced vegetables, fruits, dairy products, bread, and cereals, which are produced within the association's own farming and processing operations. Members pay a subscription fee, thus contributing to production costs. As "prosumers," they are partly responsible for production.		
Attributes/dimensions	(−)	(+)
Benefits (person vs. society)	The association provides its members with fresh, healthy, and organically produced products at an affordable price.	The association wants to contribute to the development of a sustainable and local food production system.
Accessibility (difficult vs. easy)	The service is membership-only. Subscriptions to the food box can be changed or canceled once a year. Food boxes are delivered once a week to a central "food point," located about 3 km from your home.	Users can sign up to a six-month trial subscription before becoming full members. The subscription to the food box can be changed or canceled four times a year. Food boxes are delivered once a week to your home.
Competences (low vs. high)	If they have questions, members have access to written instructions on subscription, the cultivation of vegetables or fruits, or preservation of food.	If they have questions, members have access to professional advice on subscription, cultivation of vegetables or fruits, or preservation of food. The association also organizes a broad program of professional courses and education on "Cultivating vegetables and fruit," "Urban gardening," "Treatment and preservation of food," etc.
Communality (low vs. high)	A monthly newsletter informs members and followers about news and upcoming activities.	Members and followers are invited to actively engage in the association. Collaborative assignments (e.g., collaborative sowing, cultivation, or harvest) and social events (e.g., brunches and dinners, lectures, and films) offer opportunities for like-minded people to get together and exchange experiences.

4.3.3. Private-sphere pro-environmental behaviors

To achieve our second aim—testing the interrelations between participation in sustainability initiatives and other pro-environmental behaviors—we assessed a list of different private-sphere behaviors. These were assessed prior to the presentation of the vignettes, with answer scales ranging from 1 = "never" to 5 = "very often" for each item (own formulations, inspired by Geiger et al., 2017; Kaiser, 2020). Items were merged by building mean scores for nutrition [three items: "I buy seasonal vegetables and fruits"; "I make sure that the food I buy is labeled (e.g., organic, MSC, fair trade)"; "I make sure that fruits and vegetables I buy are locally produced," Cronbach's $\alpha = 0.69$], collaborative consumption [six items: e.g., "I give away or swap things I don't use anymore"; "I purchase clothes and other things second-hand (e.g., bicycles, books, furniture, etc.)," Cronbach's $\alpha = 0.66$], and slow mobility (two items: "Shopping or recreational trips I do by public transport, e-bike, bicycle, or on foot"; "I commute to work by public transport, e-bike, bicycle, or on foot," Cronbach's $\alpha = 0.84$). Moreover, a single item was used for air travel ["I go by plane for longer journeys (500 km or more)"].

4.3.4. Ecological self-identity

Several pro-environmental motivational variables were assessed prior to the presentation of the vignettes. For the explanation of pro-environmental behavior presented in this paper we included "ecological self-identity" as a control variable. Ecological self-identity was assessed by means of three items adapted (and translated to German) from Van der Werff et al. (2014): "Acting environmentally friendly is an important part of who I am"; "I am the type of person who acts environmentally friendly"; "I see myself as an environmentally friendly person," with answer scales ranging from 1 = "I totally disagree" to 5 = "I totally agree." The three items showed high internal reliability (Cronbach's $\alpha = 0.83$), so the mean score was used for further analysis.

5. Results

5.1. Predicting the intention to use offers and services of sustainability initiatives versus the intention to volunteer for initiatives

In a first step, we ran two series of multilevel regression analyses with random intercepts and maximum-likelihood estimations (as proposed for the analysis of factorial surveys by Auspurg and Hinz, 2015). The first series of models predicted the intention to use offers and services of sustainability initiatives across all initiative types, while the second predicted the intention to volunteer for sustainability initiatives. The baseline model (Model 0) included respondents' IDs as second-level in-between variable, as each participant had been successively questioned for each of the four types of initiatives in a randomized order. Model 1 additionally included the type of initiative described by the vignette [community supported agriculture (CSA), repair café, time bank, bike sharing]. Model 2

TABLE 2 Fit indices for supplementary multilevel linear regression models explaining participants' intentions.

	Chi-square	AIC	AICC	CAIC	BIC	Parameter	df	Δ Chi-square
Intention to use the initiatives' offers and services								
Model 0	2,249.05	2,255.05	2,255.09	2,271.80	2,268.80	3	–	–
Model 1	1,990.67	2,002.67	2,002.79	2,036.17	2,030.17	6	3	258.38***
Model 2	1,976.90	1,996.90	1,997.21	2,052.72	2,042.72	10	4	13.78***
Model 3	1,295.22	1,321.22	1,321.74	1,393.51	1,380.51	13	3	681.68***
Model 4	1,249.98	1,281.98	1,282.78	1,370.82	1,354.82	16	3	45.23***
Intention to volunteer								
Model 0	2,419.92	2,425.92	2,425.95	2,442.66	2,439.66	3	–	–
Model 1	2,242.81	2,254.81	2,254.93	2,288.29	2,282.29	6	3	177.11***
Model 2	2,237.40	2,257.40	2,257.71	2,313.19	2,303.19	10	4	5.41
Model 3	1,825.07	1,851.07	1,851.60	1,923.35	1,910.35	13	3	412.33***
Model 4	1,678.00	1,710.00	1,710.80	1,798.82	1,782.82	16	3	147.07***

***$p < 0.001$.

additionally included the manipulated attributes on the vignettes (benefits, accessibility, competences, and communality). In Model 3 we added the three personal motivational factors (attitudes, perceived behavioral control, subjective social norm), and in Model 4 we additionally included the three collective motivational factors (social identity, collective efficacy belief, participative efficacy belief).

Model fit indices for both model series are shown in Table 2. All fit indices improved as the models became more inclusive. For the intention to use the initiatives' offers and services, the models' Chi-square values were significantly improved by adding the type of vignette (Model 1), the vignettes' attributes (Model 2) the predictors of the theory of planned behavior (Model 3), and those of the theories of collective action (Model 4). By contrast, for the intention to volunteer for the initiatives, the vignettes' attributes (Model 2) did not add to the model's fit. All in all, Model 4 achieved the lowest fit indices in both series and was thus the most promising model.

Table 3 details the model parameter estimates for Models 4. We found that the type of initiative presented on the vignettes significantly explained both the intention to use products and services and the intention to volunteer for initiatives. Both intentions were higher for CSA initiatives, repair cafés, and time banks than for bike sharing initiatives (post-hoc tests of an ANOVA revealed that intentions between CSA initiatives, repair cafés, and time banks do not differ significantly).

We found only limited confirmation of our Hypothesis 1, which assumed that the initiatives' attributes explain the level of participation intentions. We saw that easy accessibility increases the intention to use products and services ($b = -0.11^{*}$). However, no significant effects were revealed for the variation of benefits, competences, or communality. Moreover, we found that the variation of these attributes is irrelevant for explaining the intention to volunteer (as was already suggested by the non-significant improvement of Model 2 compared to Model 1 in Table 2).

Hypothesis 2 was largely confirmed. As shown in Table 3, the intention to use products and services of an initiative depends on attitudes ($b = 0.43^{***}$), perceived behavioral control ($b = 0.19^{***}$), collective efficacy ($b = 0.10^{**}$), and social identity ($b = 0.10^{**}$). No significant effects were found for subjective social norm and participation efficiency beliefs. The intention to volunteer for an initiative showed a similar predictor pattern, with significant effects found for attitudes ($b = 0.16^{***}$), perceived behavioral control ($b = 0.19^{***}$), participative efficacy beliefs ($b = 0.23^{***}$), and social identity ($b = 0.36^{***}$). No significant effects were found for subjective social norm and collective efficiency.

In a second step, we examined our Hypothesis 3: the assumption that the psychological predictors from the theory of planned behavior are more important than those of collective action in explaining the intentions to use an initiative's products and services, and vice versa for doing voluntary work for the initiative. While the previous multilevel analysis provided a broad overview across the different initiative types, we subsequently calculated linear regressions on the intentions to participate in each initiative type separately, in two steps. Model 1 encompassed the three motivational predictors from the theory of planned behavior (attitude, perceived behavioral control, subjective social norm). Model 2 added the collective motivational factors (social identity, collective efficacy belief, participative efficacy belief). This gave us detailed insights into the relative importance of the different standardized regression weights of the relationships.

TABLE 3 Predicting the intention to use services and offers of, and to volunteer for, sustainability initiatives across different types of initiatives (multilevel regression with randomized intercepts).

	Intention to use offers and services			Intention to volunteer		
	b	*SE*	95% CI	*b*	*SE*	95% CI
Constant	0.41**	0.14	(0.14; 0.67)	0.14	0.19	(−0.23; 0.50)
Type of initiative						
CSA (vs. bike sharing)	0.49***	0.07	(0.36; 0.62)	0.41***	0.09	(0.23; 0.58)
Repair café (vs. bike sharing)	0.61***	0.06	(0.49; 0.74)	0.31***	0.09	(0.14; 0.47)
Time bank (vs. bike sharing)	0.53***	0.06	(0.40; 0.65)	0.48***	0.09	(0.31; 0.65)
Initiatives' attributes						
Benefits (society vs. person)	0.03	0.04	(−0.06; 0.11)	−0.04	0.06	(−0.16; 0.07)
Accessibility (difficult vs. easy)	−0.11*	0.04	(−0.20; −0.02)	−0.05	0.06	(−0.17; 0.07)
Competences (high vs. low)	0.00	0.04	(−0.09; 0.09)	−0.01	0.06	(−0.12; 0.11)
Communality (high vs. low)	0.06	0.04	(−0.02; 0.15)	−0.09	0.06	(−0.20; 0.03)
Personal motivational variables						
Attitudes	0.43***	0.03	(0.37; 0.49)	0.16***	0.04	(0.07; 0.24)
Perceived behavioral control	0.19***	0.03	(0.14; 0.25)	0.19***	0.04	(0.12; 0.27)
Subjective social norm	−0.01	0.03	(−0.07; 0.04)	−0.04	0.04	(−0.12; 0.03)
Collective motivational variables						
Participative efficacy belief	0.04	0.03	(−0.02; 0.10)	0.23***	0.04	(0.14; 0.31)
Collective efficacy belief	0.10**	0.03	(0.03; 0.16)	−0.02	0.05	(−0.11; 0.07)
Social identity	0.10**	0.03	(0.04; 0.17)	0.36***	0.04	(0.28; 0.45)

$N_{vignettes} = 720$; $N_{respondents} = 180$; $^{***}p < 0.001$, $^{**}p < 0.01$, $^{*}p < 0.05$; CSA, community supported agriculture.

The upper part of Table 4 reports the findings on the regression of the intentions to use offers and services of the different initiatives (for corresponding descriptive statistics and correlations, see Supplementary material B). For all four examples, attitudes and perceived behavioral control were the strongest predictors, and this remained the case even after adding the collective motivational predictors in Model 2 (with βs between 0.36*** and 0.53** for attitude and 0.16* and 0.28*** for perceived behavioral control in Models 2, and an unexpected negative relation between subjective social norm and CSA). The collective motivations improved the explained variances of Models 2 only marginally. Occasionally, however, collective motivational factors explained additional variance (social identity in the case of repair cafés and CSA, collective efficacy belief in the case of time banks). Overall, these results supported our assumption that personal cost–benefit calculations (i.e., attitudes and perceived control) are more important than collective factors when it comes to understanding why people use offers and services of sustainability initiatives.

The lower part of Table 4 shows the same models for the intentions to volunteer (for corresponding descriptive statistics and correlations, see Supplementary material C). These results turned out to be more diverse. Contrary to the intentions to use offers and services, and in line with our assumption, this time we found collective factors to be more important than cost–benefit considerations: Social identity was an important predictor for all four initiative types (with βs between 0.26** and 0.39***), followed by belief in participative efficacy, which significantly predicts three of the four different types (with βs between 0.21** and 0.31** for those three types but non significantly with 0.09 for bike sharing). Cost–benefit considerations were less important than

TABLE 4 Predicting the intention to participate in different sustainability initiatives (standardized regression coefficients).

	Bike sharing		Repair café		Time bank		CSA	
Model	1	2	1	2	1	2	1	2
Intention to use offers and services								
Attitude	0.59***	0.53***	0.52***	0.36***	0.55***	0.43***	0.63***	0.52***
Perceived behavioral control	0.27***	0.24***	0.21**	0.16*	0.31***	0.23***	0.32***	0.28***
Subjective social norm	0.02	−0.03	0.10	0.04	−0.02	−0.01	−0.09	−0.14*
Social identity		0.10		0.18*		0.17*		0.16*
Collective efficacy belief		0.06		0.07		0.16**		0.08
Participative efficacy belief		0.01		0.10		−0.03		0.02
R^2	0.61	0.62	0.50	0.53	0.64	0.66	0.67	0.69
ΔF		1.42		2.87*		4.99**		3.49*
Intention to volunteer								
Attitude	0.33***	0.14	0.53***	0.19*	0.43***	0.16	0.42***	0.21**
Perceived behavioral control	0.29***	0.21**	0.24***	0.13*	0.32***	0.19**	0.39***	0.29***
Subjective social norm	0.05	−0.05	−0.02	−0.14*	−0.02	−0.03	−0.02	−0.11
Social identity		0.33***		0.38***		0.39***		0.26**
Collective efficacy belief		0.04		−0.05		−0.11		0.02
Participative efficacy belief		0.09		0.31***		0.21**		0.22**
R^2	0.36	0.41	0.44	0.57	0.47	0.57	0.52	0.59
ΔF		7.29***		17.80***		13.10***		9.90***

***$p < 0.001$, **$p < 0.01$, *$p < 0.05$; CSA, community supported agriculture, missing values were replaced by mean substitution.

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in the preceding analysis, with regression weights (βs) for perceived behavioral control between 0.13* and 0.29** and attitudes showing significant associations only for repair cafés ($\beta_{\text{RepairCafé}} = 0.19^{*}$) and community supported agriculture ($\beta_{\text{CSA}} = 0.21^{*}$). Subjective social norms and collective efficacy beliefs showed no explanatory power. Based on these results, we suggest differentiating our assumption in Hypothesis 3: The collective motivational factors, namely social identity and participative efficiency, play a more important role in explaining the intention to volunteer than in explaining the intention to use offers and services. Personal cost–benefit considerations (namely attitudes and perceived behavioral control) are less important, but do not completely lose their explanatory power.

5.2. Associations between participation in sustainability initiatives and private-sphere pro-environmental behaviors

In a last step, we tested whether participants' current level of reported participation in one or several sustainability initiatives was associated with other, private-sphere pro-environmental behaviors, and whether such an association could be explained by a common, cross-behavioral motivation, namely high ecological self-identity. We ran linear regression models regressing the reported frequency of different pro-environmental behaviors on sociodemographic characteristics and ecological self-identity (Model 1), supplemented with the frequency of participation in sustainability initiatives (Model 2). Table 5 gives an overview of the standardized regression coefficients of these different models. The corresponding correlation matrix and information on other regression coefficients can be found in Supplementary material D.

Models 1 in Table 5 contain the sociodemographic control variables, as well as ecological self-identity. We found significant correlations between ecological self-identity and the assessed pro-environmental behaviors. People who describe themselves as persons who care for the environment eat more sustainably ($\beta = 0.28^{***}$), engage in more collaborative consumption ($\beta = 0.27^{***}$) and slow mobility ($\beta = 0.20^{**}$), and travel less by air ($\beta = -0.26^{***}$). The sociodemographic control variables in Models 1 only selectively explain variance in the pro-environmental behaviors. Women eat more sustainably ($\beta = 0.18^{*}$) and are more likely to engage in collaborative consumption ($\beta = 0.27^{***}$). Slow travel is more likely to be practiced by individuals in urban neighborhoods ($\beta = 0.30^{***}$). And individuals with higher incomes eat more sustainably ($\beta = 0.14^{*}$) but engage in less collaborative consumption ($\beta = -0.17^{*}$) and travel by air more often ($\beta = 0.18^{*}$).

TABLE 5 Associations between participation in different sustainability initiatives and individual pro-environmental behaviors (standardized regression coefficients).

	Nutrition		Collaborative consumption		Slow mobility		Air travel	
Model	1	2	1	2	1	2	1	2
Gender (0 = m, 1 = f)	0.18*	0.20**	0.27***	0.26***	−0.08	−0.09	0.04	0.01
Age	0.01	0.07	−0.13	−0.17*	−0.14*	−0.13	−0.01	−0.04
Residential area	0.03	0.02	−0.06	−0.02	0.30***	0.29***	0.04	0.03
Income	0.14*	0.13	−0.17*	−0.14*	0.07	0.07	0.18*	0.19*
Self-identity	0.28***	0.23**	0.27***	0.22**	0.20**	0.18*	−0.26***	−0.23**
Bike sharing		−0.09		0.09		0.02		0.02
Time bank		0.02		0.09		0.04		0.06
Repair café		0.03		0.24**		−0.03		−0.10
CSA		0.23**		0.05		0.06		−0.12
R^2	0.13	0.17	0.23	0.31	0.15	−0.09	0.11	0.13
ΔF	5.06***	2.16	10.34***	5.09**	6.01***	0.273	4.06**	1.11

***p < 0.001, **$p < 0.01$, *$p < 0.05$, missing values have been replaced by mean substitution. For other model coefficients see Supplementary material D. Increasing values represent increasing pro-environmental behavior for nutrition, collaborative consumption, and slow mobility, whereas the opposite is the case for air travel.

Models 2 in Table 5 show that current participation in sustainability initiatives can explain variance in pro-environmental behavior beyond the underlying ecological self-identity in two of the four tested behaviors. Individuals who are involved in CSA initiatives eat more sustainably ($\beta = 0.23^{**}$). Individuals who are involved in repair cafés are more likely to engage in collaborative consumption ($\beta = 0.24^{**}$). However, no additional variance can be explained for slow mobility and air travel.

6. Discussion

6.1. Discussion of the results

The first aim of this study was to gain a better understanding of why people participate in sustainability initiatives. We surveyed participants' intentions to participate in four different fictive examples of initiatives with varying attributes. Figure 3 visually summarizes our results for the intention to use offers and services of initiatives (left) and the intention to volunteer for initiatives (right). Contrary to our first hypothesis, we found only partial support for our assumption that differences in the motivation to participate in sustainability initiatives depend on the type and attributes of the initiative, as proposed by a typology of social innovations for sustainable consumption by Jaeger-Erben et al. (2015, 2017). Overall, we found that easy access to the offers and services of an initiative is key for the intention to use them. However, the other attributes assessed (benefits, competences, communality) were unimportant in explaining intentions, and even accessibility lost its explanatory role when looking at the intention to volunteer.

In line with our second hypothesis, we found confirmation that different motivational factors derived from the theory of planned behavior and theories on collective action related positively to the intention to participate in sustainability initiatives. Moreover, in line with our third hypothesis, the results suggest that motivational patterns differ depending on the level of involvement (a low level of involvement being the "use of offers and services" of initiatives—as a customer—and a higher level being "engagement in or voluntary work for" initiatives). The higher level was best predicted by a strong social identity—in our case, the degree of identification with the initiatives' goals and members—and the belief in high participative efficacy, which is the belief that one's own engagement will make a significant difference. By contrast, we found that less intensive involvement, in the form of the intention to use the services and offers of initiatives, was better predicted by cost–benefit considerations, that is, favorable attitudes and perceived behavioral control.

Our second aim was to learn more about whether participation in sustainability initiatives is associated with other, private-sphere pro-environmental behaviors. We found positive relationships for those two out of the four assessed behaviors that were more closely linked to the examples of initiatives used, namely nutrition and collaborative consumption. This nourishes the assumption that engagement in sustainability initiatives might motivate related other private-sphere pro-environmental behaviors. Most interestingly, the relationships found even persisted when controlling for ecological self-identity.

6.2. Theoretical implications

Our study shows that a comprehensive framework of notions about grassroots innovations, individual behavior-change theories (such as the theory of planned behavior, Fishbein and Ajzen, 2011) and collective action theories (Van Zomeren et al., 2008, 2013; Fritsche et al., 2018), as applied in the present research, expands our understanding of why people participate in sustainability initiatives. First, our results affirm the findings of the more descriptive approaches used in research on sustainable grassroots innovations (e.g., Moraes et al., 2012; Dubois et al., 2014; Grabs et al., 2016; Maschkowski et al., 2017). Second, our findings show that attributes of initiatives (Jaeger-Erben et al., 2015, 2017) namely an easy access to the offers and services of initiatives matter for participation in some cases. Third, and most interesting, our findings add empirical evidence to the theoretical frameworks from environmental psychological research on individual and collective action, i.e., private-sphere, and public sphere pro-environmental behavior. The diverging predictor patterns that we found between the different forms of involvement support the idea that it may be particularly promising to combine the theory of planned behavior and theories on collective action into a more comprehensive framework to enrich our understanding of differences in motives of different levels of involvement, as done in the present study.

On the one hand, our findings support arguments of previous studies that collective action as well as collaborative consumption are rooted in a combination of egoistic and normative motives (Bamberg et al., 2015; Martin and Upham, 2016; Roos and Hahn, 2017b). We found that less intensive involvement, in the form of the intention to use the services and offers of initiatives, was well predicted by cost–benefit considerations, that is, favorable attitudes and perceived behavioral control. These findings are in line with results of previous studies on collaborative consumption (Barnes and Mattsson, 2017; Roos and Hahn, 2017b), and they support the notion that pro-environmental behavior change theories, such as the theory of planned behavior, are suitable to inform our understanding of why people participate in sustainability initiatives. Also in line with this previous research is our finding that subjective social norms are less important than attitudes and perceived behavioral control. However, it is possible that

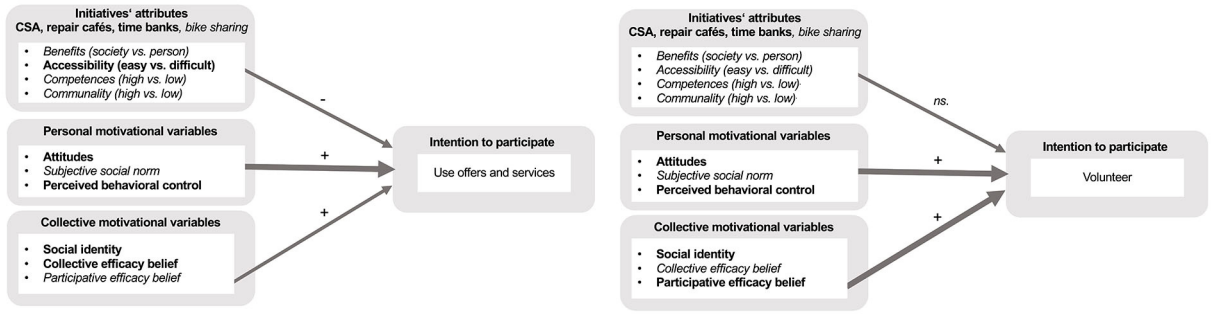

FIGURE 3
Visual summary of the correlations found for the intention to use offers and services (left) and the intention to volunteer (right). Highlighted = significant predictors, italics = nonsignificant predictors (based on Table 3). Strength of arrows = Strength of the correlations (based on Table 4). CSA, community supported agriculture.

effects of social norms indirectly affect intentions *via* attitudes and perceived behavioral control, as suggested by more complex frameworks (e.g., Bamberg and Möser, 2007, though contrary to the model of Rees and Bamberg, 2014). Another explanation for the low predictive power of social norms is the possibility that the questions we asked in this respect were too general, and that we did not assess in-group norms, which might have been more informative (Fielding and Hornsey, 2016). Future research is needed to shed more light on the exact interplay of social norms with other motivational factors.

On the other hand, we found that high involvement, in the form of volunteering for sustainability initiatives is well predicted by feelings of social identity, and participative efficacy beliefs, as proposed by frameworks of Van Zomeren et al. (2008, 2013) or Fritsche et al. (2018). However, our results suggest that perceived participative efficacy is a stronger motivator for collective action than collective efficacy, that is, the general belief in the power of the collective. In addition to these findings our results suggest that volunteering is not solely based on collective motives: positive attitudes and strong perceived behavioral control in our study were also associated with the intention to volunteer, i.e., collective action theories should be extended by individual cost-benefit considerations.

Last but not least, our results extend our knowledge of possible cross-behavioral effects of participation in initiatives on behavior in private daily life. Ecological self-identity was found to be a cross-behavioral motivational variable in several previous studies (Whitmarsh and O'Neill, 2010; Van der Werff et al., 2013; Sloot et al., 2018; Schmitt et al., 2019). Moreover, it has been argued that engagement in a first behavior (e.g., participation in sustainability initiatives) strengthens one's own ecological identity and thus spills over into other pro-environmental behaviors (Lauren et al., 2019). In this context, our finding that participation explained other pro-environmental behaviors independently from ecological self-identity is of particular interest. We cannot derive causality interpretations from our cross-sectional design, and the dynamics between participation in initiatives, spillover to other behavioral domains, and the precise role of self-identity absolutely require attention in the future, ideally within longitudinal research designs. What we can say is that our results support the notion that participation in sustainability initiatives might be an important part of a broader sustainable lifestyle (Vita et al., 2020). Moreover, we did not find any indication that participation in sustainability initiatives increases environmentally harmful behavior (e.g., air travel) by serving as an excuse (behavior rebound effects), as suspected by some of our interviewees in the qualitative pre-study.

6.3. Practical implications

Even considering the study's limitations we believe that our findings are of important practical relevance. First, our findings indicate that participation in sustainability initiatives may have beneficial effects on resource-efficient everyday consumption behavior. Although we believe that the exact dynamics deserve more attention in future research, this suggests that participation in sustainability initiatives may act as a door opener for broader behavioral changes, which enlarges the contribution of sustainability initiatives for natural resource conservation beyond their core services and offers. This can strengthen initiatives in their argumentation for support, for example vis-à-vis policymakers.

Second, the divergence found between the motivational pattern of users and volunteers of sustainability initiatives has implications for the operation of initiatives. Diverging motives have been described as a challenge for the success of initiatives in previous case studies (e.g., Moraes et al., 2012; Dubois et al., 2014; Fitzmaurice and Schor, 2018), and consistency in expectations and goals has been identified as one key success factor (Seyfang and Longhurst, 2016). Thus, for volunteers, awareness and consideration of user needs may be indispensable

if sustainability initiatives aim to scale up beyond the small circle of highly aware and engaged initiators to the broader public. Beneficial attitudes and easy accessibility turned out to be of particular importance. Exchange and user inclusion in the design of offers, and also the question of how accessibility can be increased, are therefore of central importance for sustainability initiatives. Easy accessibility is related to the choice of location. For an attractive choice of location, initiatives often depend on support from and collaboration with strong intermediaries and partners or local community authorities. On the other hand, initiatives depend on high levels of commitment from members and volunteers that are not monetarily compensated. Our results show that the conviction of being able to contribute to sustainable development together with like-minded people has a particularly motivating effect. It is therefore vital for initiatives to take these motives into account and to provide space for reflection on efficacy experiences. Perceived costs of volunteering might be a barrier, and finding ways of lowering or sharing the workload and of strengthening social identity and the beliefs in participative efficacy are promising strategies.

Only the long-term survival of sustainability initiatives and a broader uptake of the new consumption practices they promote will eventually bring beneficial changes in terms of a reduction in the overall consumption-based environmental pressure. Based on our findings, balancing the needs of users and volunteers seems to be key to success.

6.4. Limitations and future research avenues

We already mentioned the cross-sectional design of our study as one limitation preventing us from interpreting the causality of the relationships found. For deeper insights, for example on spillover effects from participating in sustainability initiatives, future research should adopt experimental and/or longitudinal research designs (Galizzi and Whitmarsh, 2019). Regarding the explanation of intentions to participate, we tried to counter this shortcoming of cross-sectional surveys by integrating a factorial survey design (Auspurg and Hinz, 2015). We thus investigated the effects of randomly presented attributes on the intentions to participate, which better justifies an interpretation of causal effects than a merely correlative design does. The disadvantage of this procedure was, however, that participants made judgments on fictitious situations and a potential "hypothetical bias" cannot be excluded (Beck et al., 2016). In other words, there is no guarantee that participants would make the same decisions in real life.

A second weakness of our study is that we could only examine behavioral intentions and self-reported behavior. For future studies, it would be desirable to include more broadly based behavior observation.

Third, our predictors, which we derived from the theories of planned behavior, and collective action, were collected with a single item for each of the four vignette examples presented. In the multilevel analysis, the single items were aggregated over the four examples for each predictor. Even though single-item constructs show good validity in some applications (e.g., Postmes et al., 2013; Jovanović and Lazić, 2020) multi-item measurements are generally preferable (Diamantopoulos et al., 2012). However, due to the repetition of the four vignette examples for each participant, we had to compromise with single items to avoid excessive questionnaire length and thus participant fatigue. For future research, however, we recommend an in-depth study with multi-item variables.

Forth, although the wording of the vignettes presented was informed by our qualitative pre-study, the attempt to formulate comparable attributes for all four initiative types might have had the shortcoming of ignoring type-specific features. Thus, to learn more about fostering or hindering characteristics of specific initiatives, future research should go into more detail.

Fifth, with our design, we also cannot rule out the possibility that the randomized sequence of vignettes influenced responses on the motivational factors. Future studies should take this weakness into account.

Finally, our results are derived from a rather small sample, albeit a diverse one in terms of socio-economic characteristics. The generalizability of our findings to other examples of initiatives and other geographic contexts must be questioned. It may be worth seeing whether the same effects are found in broader, more representative samples, with other examples of sustainability initiatives, and in other geographical contexts.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. The patients/participants provided their written informed consent to participate in this study.

Author contributions

SM contributed to the conceptualization, methodology, data gathering, data analysis, and writing of the original draft. CB contributed to the conceptualization and reviewing of the

drafted manuscript. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

Supplementary material

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/frsus.2022.994881/full#supplementary-material

References

Ajzen, I. (1991). The theory of planned behavior. *Organ. Behav. Hum. Decis. Process.* 50, 179–211. doi: 10.1016/0749-5978(91)90020-T

Auspurg, K., and Hinz, T. (2015). *Factorial Survey Experiments*. Quantitative Applications in the Social Sciences. Thousand Oaks, CA: SAGE Publications.

Avelino, F., Wittmayer, J. M., Pel, B., Weaver, P., Dumitru, A., Haxeltine, A., et al. (2019). Transformative social innovation and (dis)empowerment. *Technol. Forecast. Soc. Change* 145, 195–206. doi: 10.1016/j.techfore.2017.05.002

Bamberg, S., and Möser, G. (2007). Twenty years after Hines, Hungerford, and Tomera: a new meta-analysis of psycho-social determinants of pro-environmental behaviour. *J. Environ. Psychol.* 27, 14–25. doi: 10.1016/j.jenvp.2006.12.002

Bamberg, S., Rees, J., and Seebauer, S. (2015). Collective climate action: determinants of participation intention in community-based pro-environmental initiatives. *J. Environ. Psychol.* 43 (Suppl. C), 155–165. doi: 10.1016/j.jenvp.2015.06.006

Barnes, S. J., and Mattsson, J. (2017). Understanding collaborative consumption: test of a theoretical model. *Technol. Forecast. Soc. Change* 118, 281–292. doi: 10.1016/j.techfore.2017.02.029

Beck, M. J., Fifer, S., and Rose, J. M. (2016). Can you ever be certain? Reducing hypothetical bias in stated choice experiments via respondent reported choice certainty. *Trans. Res. Part B Methodol.* 89, 149–167. doi: 10.1016/j.trb.2016.04.004

Bengtsson, M., Alfredsson, E., Cohen, M., Lorek, S., and Schroeder, P. (2018). Transforming systems of consumption and production for achieving the sustainable development goals: moving beyond efficiency. *Sustain. Sci.* 13, 1533–1547. doi: 10.1007/s11625-018-0582-1

Cohen, M. J. (2015). "Toward a post-consumerist future? Social innovation in an era of fading economic growth," in *Handbook of Research on Sustainable Consumption*, eds L. A. Reisch and J. Thogersen (Cheltenham; Boston, MA: Edward Elgar Publishing), 426–442.

Diamantopoulos, A., Sarstedt, M., Fuchs, C., Wilczynski, P., and Kaiser, S. (2012). Guidelines for choosing between multi-item and single-item scales for construct measurement: a predictive validity perspective. *J. Acad. Mark. Sci.* 40, 434–449. doi: 10.1007/s11747-011-0300-3

Dubois, E. A., Schor, J. B., and Carfagna, L. B. (2014). "New cultures of connection on a Boston time bank," in *Sustainable Lifestyles and the Quest for Plenitude : Case Studies of the New Economy*, edited by J. B. Schor and C. J. Thompson (New Haven, London: Yale University Press), 95–124.

Dülmer, H. (2016). The factorial survey: design selection and its impact on reliability and internal validity. *Sociol. Methods Res.* 45, 304–347. doi: 10.1177/0049124115582269

Ertz, M., Karakas, F., and Sarigöll,ü, E. (2016). Exploring pro-environmental behaviors of consumers: an analysis of contextual factors, attitude, and behaviors. *J. Bus. Res.* 69, 3971–3980. doi: 10.1016/j.jbusres.2016.06.010

Fielding, K. S., and Hornsey, M. J. (2016). A social identity analysis of climate change and environmental attitudes and behaviors: insights and opportunities. *Front. Psychol.* 7, 121. doi: 10.3389/fpsyg.2016.00121

Fishbein, M., and Ajzen, I. (2011). *Predicting and Changing Behavior: The Reasoned Action Approach*. New York, NY: Psychology Press. doi: 10.4324/9780203838020

Fitzmaurice, C., and Schor, J. B. (2018). Homemade matters: logics of opposition in a failed food swap. *Soc. Probl.* 66, 144–161. doi: 10.1093/socpro/spx046

Frantzeskaki, N., Dumitru, A., Anguelovski, I., Avelino, F., Bach, M., Best, B., et al. (2017). Elucidating the changing roles of civil society in urban sustainability transitions. *Curr. Opin. Environ. Sustain. Syst. Dynam. Sustain.* 22, 41–50. doi: 10.1016/j.cosust.2017.04.008

Fritsche, I., Barth, M., Jugert, P., Masson, T., and Reese, G. (2018). A social identity model of pro-environmental action (SIMPEA). *Psychol. Rev.* 125, 245–269. doi: 10.1037/rev0000090

Galizzi, M. M., and Whitmarsh, L. (2019). How to measure behavioural spillovers: a methodological review and checklist. *Front. Psychol.* 10, 342. doi: 10.3389/fpsyg.2019.00342

Geels, F. W. (2019). Socio-technical transitions to sustainability: a review of criticisms and elaborations of the multi-level perspective. *Curr. Opin. Environ. Sustain.* 39, 187–201. doi: 10.1016/j.cosust.2019.06.009

Geiger, S. M., Fischer, D., and Schrader, U. (2017). Measuring what matters in sustainable consumption: an integrative framework for the selection of relevant behaviors. *Sustain. Dev.* 26, 18–33. doi: 10.1002/sd.1688

Grabs, J., Langen, N., Maschkowski, G., and Schäpke, N. (2016). Understanding role models for change: a multilevel analysis of success factors of grassroots initiatives for sustainable consumption. *J. Clean. Prod.* 134, 98–111. doi: 10.1016/j.jclepro.2015.10.061

Hossain, M. (2018). Grassroots innovation: the state of the art and future perspectives. *Technol. Soc.* 55, 63–69. doi: 10.1016/j.techsoc.2018.06.008

Jaeger-Erben, M., Rückert-John, J., and Schäfer, M. (2015). Sustainable consumption through social innovation: a typology of innovations for sustainable consumption practices. *J. Clean. Prod.* 108, 784–798. doi: 10.1016/j.jclepro.2015.07.042

Jaeger-Erben, M., Rückert-John, J., and Schäfer, M. (2017). Do-it-yourself oder do-it-together? – eine typologie sozialer innovationen für nachhaltigen konsum," in *Soziale Innovationen Für Nachhaltigen Konsum*, eds M. Jaeger-Erben, J. Rückert-John, and M. Schäfer (Wiesbaden: Springer Fachmedien Wiesbaden), 23–50.

Jans, L. (2021). Changing environmental behaviour from the bottom up: the formation of pro-environmental social identities. *J. Environ. Psychol.* 73, 101531. doi: 10.1016/j.jenvp.2020.101531

Jovanović, V., and Lazić, M. (2020). Is longer always better? A comparison of the validity of single-item versus multiple-item measures of life satisfaction. *Appl. Res. Qual. Life* 15, 675–692. doi: 10.1007/s11482-018-9680-6

Kaiser, F. G. (2020). "GEB-50. General ecological behavior scale [Verfahrensdokumentation, Fragebogen Deutsch Und Englisch], " in *Open Test Archive, edited by Leibniz-Institut für Psychologie* (ZPID. Trier: ZPID).

Klandermans, B. (1997). *The Social Psychology of Protest*. Oxford; Cambridge, MA: Blackwell Publishers.

Klandermans, B. (2004). The demand and supply of participation: social-psychological correlates of participation in social movements. *Blackwell Companion Soc. Movements* 360–79. doi: 10.1002/9780470999103.ch16

Klöckner, C. A. (2013). A comprehensive model of the psychology of environmental behaviour—a meta-analysis. *Global Environ. Change* 23, 1028–1038. doi: 10.1016/j.gloenvcha.2013.05.014

Lauren, N., Smith, L. D. G., Louis, W. R., and Dean, A. J. (2019). Promoting spillover: how past behaviors increase environmental intentions by cueing self-perceptions. *Environ. Behav.* 51, 235–258. doi: 10.1177/0013916517740408

Liobikiene, G., and Poškus, M. S. (2019). The importance of environmental knowledge for private and public sphere pro-environmental behavior: modifying the value-belief-norm theory. *Sustainability* 11, 3324. doi: 10.3390/su11123324

Longhurst, N., Avelino, F., Wittmayer, J., Weaver, P., Dumitru, A., Hielscher, S., et al. (2016). Experimenting with alternative economies: four emergent counter-narratives of urban economic development. *Curr. Opin. Environ. Sustain.* 22, 69–74. doi: 10.1016/j.cosust.2017.04.006

Martin, C. J., and Upham, P. (2016). Grassroots social innovation and the mobilisation of values in collaborative consumption: a conceptual model. *J. Clean. Prod.* 134, 204–213. doi: 10.1016/j.jclepro.2015.04.062

Maschkowski, G., Schäpke, N., Grabs, J., and Langen, N. (2017). "Learning from co-founders of grassroots initiatives: personal resilience, transition, and behavioral change - a salutogenic approach," in *Resilience, Community Action and Societal Transformation*, eds T. Henfrey, G. Maschkowski, and G. Penha-Lopes (East Meon, Hampshire: Permanent Publications), 65–84.

Moraes, C., Carrigan, M., and Szmigin, I. (2012). The coherence of inconsistencies: attitude–behaviour gaps and new consumption communities. *J. Mark. Manag.* 28, 103–128. doi: 10.1080/0267257X.2011.615482

Moser, S., Schmidt, S., Bader, C., Mack, V., Osuna, E., and Holenstein, M. (2018). *Analyse von freiwilligen Angeboten und Initiativen mit Bezug zu suffizientem Verhalten [Analysis of voluntary offers and initiatives related to sustainable behavior]*. Zürich: Energieforschung Stadt Zürich. doi: 10.7892/boris.121199

Postmes, T., Haslam, S. A., and Jans, L. (2013). A single-item measure of social identification: reliability, validity, and utility. *Br. J. Soc. Psychol.* 52, 597–617. doi: 10.1111/bjso.12006

Rees, J., and Bamberg, S. (2014). Climate protection needs societal change: determinants of intention to participate in collective climate action. *Eur. J. Soc. Psychol.* 44, 466–473. doi: 10.1002/ejsp.2032

Roos, D., and Hahn, R. (2017a). Does shared consumption affect consumers' values, attitudes, and norms? A panel study. *J. Bus. Res.* 77 (Suppl. C), 113–123. doi: 10.1016/j.jbusres.2017.04.011

Roos, D., and Hahn, R. (2017b). Understanding collaborative consumption: an extension of the theory of planned behavior with value-based personal norms. *J. Bus. Ethics* 158, 679–697. doi: 10.1007/s10551-017-3675-3

Schmitt, M. T., Mackay, C. M. L., Droogendyk, L. M., and Payne, D. (2019). What predicts environmental activism? The roles of identification with nature and politicized environmental identity. *J. Environ. Psychol.* 61, 20–29. doi: 10.1016/j.jenvp.2018.11.003

Schor, J. (2016). Debating the sharing economy. *J. Self Gov. Manage. Econ.* 4, 7–22. doi: 10.22381/JSME4320161

Schulte, M., Bamberg, S., Rees, J., and Rollin, P. (2020). Social identity as a key concept for connecting transformative societal change with individual environmental activism. *J. Environ. Psychol.* 72, 101525. doi: 10.1016/j.jenvp.2020.101525

Seyfang, G. (2009). *The New Economics of Sustainable Consumption: Seeds of Change. Energy, Climate, and the Environment Series*. Basingstoke: Palgrave Macmillan.

Seyfang, G., and Longhurst, N. (2016). What influences the diffusion of grassroots innovations for sustainability? Investigating community currency niches. *Technol. Anal. Strategic Manage.* 28, 1–23. doi: 10.1080/09537325.2015.1063603

Seyfang, G., and Smith, A. (2007). Grassroots innovations for sustainable development: towards a new research and policy agenda. *Env. Polit.* 16, 584–603. doi: 10.1080/09644010701419121

Signori, S., and Forno, F. (2016). Closing the attitude-behaviour gap: the case of solidarity purchase groups. *Agricult. Agricult. Sci. Proc.* 8, 475–481. doi: 10.1016/j.aaspro.2016.02.048

Sloot, D., Jans, L., and Steg, L. (2018). Can community energy initiatives motivate sustainable energy behaviours? The role of initiative involvement and personal pro-environmental motivation. *J. Environ. Psychol.* 57, 99–106. doi: 10.1016/j.jenvp.2018.06.007

Stern, P. C. (2000). New environmental theories: toward a coherent theory of environmentally significant behavior. *J. Soc. Issues* 56, 407–424. doi: 10.1111/0022-4537.00175

Tagkaloglou, S., and Kasser, T. (2018). Increasing collaborative, pro-environmental activism: the roles of motivational interviewing, self-determined motivation, and self-efficacy. *J. Environ. Psychol.* 58, 86–92. doi: 10.1016/j.jenvp.2018.06.004

Van der Werff, E., Steg, L., and Keizer, K. (2013). The value of environmental self-identity: the relationship between biospheric values, environmental self-identity and environmental preferences, intentions and behaviour. *J. Environ. Psychol.* 34, 55–63. doi: 10.1016/j.jenvp.2012.12.006

Van der Werff, E., Steg, L., and Keizer, K. (2014). I am what I am, by looking past the present: the influence of biospheric values and past behavior on environmental self-identity. *Environ. Behav.* 46, 626–657. doi: 10.1177/0013916512475209

Van Stekelenburg, J., Klandermans, B., and Van Dijk, W. W. (2009). Context matters: explaining how and why mobilizing context influences motivational dynamics. *J. Soc. Issues* 65, 815–838. doi: 10.1111/j.1540-4560.2009.01626.x

Van Zomeren, M., Postmes, T., and Spears, R. (2008). Toward an integrative social identity model of collective action: a quantitative research synthesis of three socio-psychological perspectives. *Psychol. Bull.* 134, 504–535. doi: 10.1037/0033-2909.134.4.504

Van Zomeren, M., Postmes, T., and Spears, R. (2012). On conviction's collective consequences: integrating moral conviction with the social identity model of collective action: conviction's collective consequences. *Br. J. Soc. Psychol.* 51, 52–71. doi: 10.1111/j.2044-8309.2010.02000.x

Van Zomeren, M., Saguy, T., and Schellhaas, F. M. H. (2013). Believing in "making a difference" to collective efforts: participative efficacy beliefs as a unique predictor of collective action. *Group Processes Intergroup Relat.* 16, 618–634. doi: 10.1177/1368430212467476

Vita, G., Ivanova, D., Dumitru, A., García-Mira, R., Carrus, G., Stadler, K., et al. (2020). Happier with less? Members of European environmental grassroots initiatives reconcile lower carbon footprints with higher life satisfaction and income increases. *Energy Res. Soc. Sci.* 60, 101329. doi: 10.1016/j.erss.2019.101329

Whitmarsh, L., and O'Neill, S. (2010). Green identity, green living? The role of pro-environmental self-identity in determining consistency across diverse pro-environmental behaviours. *J. Environ. Psychol.* 30, 305–314. doi: 10.1016/j.jenvp.2010.01.003

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Barriers and enablers of 1.5° lifestyles: Shallow and deep structural factors shaping the potential for sustainable consumption

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Introduction: Transforming consumption and lifestyles toward sustainability cannot be achieved by individual behavior change alone but requires changes in the structures in which this behavior is embedded. However, "structure" is a blurry concept and scholars use it in a multitude of ways. What often remains implicit in studies on structural phenomena are different types of structures, how they may or may not restrict the agency of individuals in particular ways, and how these restrictions support sustainable consumption patterns at the societal level. To move beyond the current state of research, this article systematizes political, economic, technological, and societal structural factors the literature identifies as impactful regarding the sustainability of consumption and lifestyles compatible with the targets of the Paris Agreement.

Methods: We draw on a systematic review of existing research and use empirical observations to develop conceptual terms that revisit the structure-agency dilemma and offer ways going forward about (un)sustainable consumption.

Results: We do so based on the material or ideational, as well as shallow or deep nature of these factors. Thereby, the article throws light on the deep and opaque material and ideational structural factors lying underneath and shaping the sustainability impact of the more visible, shallow structural factors typically considered in public debates about sustainability governance.

Discussion: The article, thus, highlights the need to consider and address these deep structural factors for any effective pursuit of transformation.

KEYWORDS

sustainable consumption, lifestyles, structures, climate change, mobility, food, housing, leisure

1. Introduction

Despite 50 years of scientific knowledge about the effects of continued growth in production and consumption on the environment (Meadows et al., 1972; Wilcox, 1975), societies have failed to take necessary action and are facing multiple interrelated and mutually reinforcing global sustainability crises (IPBES, 2016; Newell et al., 2021; IPCC, 2022). Many scholars have argued that this failure to achieve progress is tightly linked to the individual, behavioral focus, dominant in much of sustainability governance, especially sustainable consumption governance, which ignores the embeddedness of (over)consumption in economic, political, technological, and societal structures and the

limits to agency of individuals (Schnaiberg, 1980; Maniates, 2001, 2020; Fuchs and Lorek, 2005; Stoddard et al., 2021). Accordingly, a substantial share of research on sustainable development and consumption has started to focus on the structures in which consumption behavior is embedded, and we now have a large and further burgeoning literature on structural conditions and effects.[1]

There can be no doubt that structures play a vital role in sustainability transformations. Effectively addressing the climate crisis requires societal, economic, political, and technological change at the structural level. More specifically, current unsustainable lifestyles and consumption practices are influenced and enabled by a range of structural categories such as societal foundations, economic superstructures, policies and regulations, infrastructures, and the (non-)availability of appliances and technologies (Fuchs et al., 2021a). Essentially, the societal and economical order, the wider system that makes humans function as a social entity, must be transformed toward different, maintainable ways of con*struct*ing and con*stru*ing our lives. Indeed, the necessary deep transformation stipulated also in the most recent IPCC (2022) report requires structural changes in all spheres of life, changes that simultaneously allow the pursuit of social justice, avoid societal conflict, and foster long-term individual and societal wellbeing within planetary boundaries. As the crisis aggravates, the decisive role of wider structural relations—including power relations—can no longer be ignored. Structure is a rather blurry concept used in a myriad of ways in the literature.[2] While social structures are commonly defined in opposition with agency and accordingly as constraints on action and on social change, this strict opposition has been challenged (e.g., Guy, 2022). The focus of this paper, thus, is not on—possibly unresolvable—theoretical debates on structure vs. agency but on reducing the blurriness of the concept by systematizing structural factors that may hinder or enable change to make them more tangible for climate governance and transformations toward 1.5° lifestyles, compatible with the targets of the Paris Agreement. While some scholars may use terms such as "structures" or "configuration" to refer to the—in our conception: rather "shallow"—contexts of specific policies or policy regimes, such as subsidies for electric vehicles, others may employ it to capture the—rather "deep"—impact of capitalism. This situation amounts to comparing very different phenomena and concepts when speaking of "structures." The consequence is that research on the structural impacts on the sustainability of consumption and lifestyles is extremely difficult to systematize and synthesize, and yet such a systematization and synthesis is urgently needed for moving forward in scholarly understanding, political advice, and, last but not least, governance.

In this article, we first ask which structural factors are—directly or indirectly—identified as impactful by the literature concerned with sustainability. We then seek to bring more clarity into the blurry picture of structural factors impacting the sustainability of consumption and lifestyles. Specifically, we aim to systematize the state of the art on these structural factors using a conceptual differentiation between material and ideational, and shallow and deep factors to identify impactful structural enablers of and barriers to a sustainability transformation. We pursue this objective *via* a content analysis of a large body of current scientific literature.

The article is structured as follows. The next section briefly reviews structural theory and lays out our understanding of "structures" as well as our conceptual approach to differentiating between structural factors. Section 3 delineates the methodology used for building and analyzing the text corpus. Section 4, then, presents our results by systematizing structural factors from political, economic, technological and societal contexts by distinguishing barriers and enablers as well as shallow and deep factors. Section 5 summarizes the findings and discusses implications for research and governance, followed by a conclusion in section 6.

2. Conceptualizing structures

In order to systematize existing insights on structural enablers of and barriers to the sustainability transformation, it is vital to clarify what we mean by structural factors, how we can evaluate their influence, and distinguish them for analytic purposes.

2.1. Structure(s) and agency

Researchers as well as practitioners tend to use the term "structure" in a broad variety of ways. Common language often conceives of structures as "order" and thus the opposite of "chaos," whereas, in academic definitions, a structure is often associated with and opposed to agency or agential action (e.g., Hayward and Lukes, 2008; Powell, 2013; Guy, 2022). This resonates with the common language term insofar as structures work in powerful ways to limit agency and *order* behavior. Giddens (1984, p. 25) defines a structure as a sum of "rules and resources, or sets of transformation relations, organized as properties of social systems." Importantly, Giddens' structuration approach goes beyond the rather static understanding of structures determining behavior through constraints. He suggested the term structuration to emphasize that social life is both dynamic and ordered: "The structural components of society, embedded in an enduring way in institutions, are [...] both enabling and constraining" (Giddens, 1983, p. 78). Therefore, we look at structural components of society, or, more specifically, at structural factors asserted in the literature that hinder or enable a shift toward 1.5° lifestyles. By contrast, non-structural factors would be personal constraints and opportunities directly pertaining to the behavior and choices of individuals at the household level. For example, in a non-structural perspective an individual may be conjured to make "good" choices to live sustainably, without the web of social relations and conditions in which choices are made being addressed. Of course, the two

1 Relevant literatures include social practice theory (Warde, 2005; Sahakian, 2019), consumption corridors (Di Giulio and Fuchs, 2014; Fuchs et al., 2021a), the externalization society (Lessenich, 2019); imperial modes of living (Brand and Wissen, 2021); sustainable/1.5° lifestyles (Lettenmeier, 2018; IGES et al., 2019), and sociotechnical transition pathways (Geels, 2002; Geels and Schot, 2007).

2 Etymologically, the term comes from Latin *structura* and can either refer to any built structure in the material sense or to the order of any social institution or process in a more abstract sense.

levels are connected. However, both science and policy can and frequently have put the spotlight on one or the other level, over the last decades.

Other scholars reject the idea of structures and explain the dynamics of change and stability through networked relations of human and non-human actants (Callon, 1986; Latour, 2005). To bridge Actor Network Theory with structural theory, Greenhalgh and Stones (2010) account for both the knowledgeability of actors and the influence of external and internal structures[3]. Instead of talking about structures, some prefer to focus on configurations. Technologies, for example, can be characterized as "configurations that work" (Rip and Kemp, 1998, p. 330). Created and shaped by social, economic and political forces, technologies cannot be reduced to tools but also include skills and, underpinned by a systems view, merge into a background of wider societal systems, regimes, or sociotechnical landscapes (Rip and Kemp, 1998).

In the context of the climate crisis and (un)sustainable lifestyles, it is a problem how easy it is to attribute responsibility to individual households and overlook the influence of structures. Indeed, most contemporary approaches focusing on structural power highlight that the relevant power relations often remain obscure due to their embeddedness in systems of knowledge and communication and their shaping of behavioral routines.[4] This obscurity makes identifying, evaluating, and challenging structural power difficult. In turn, a "dilemma" that comes with thinking-in-structures is that, in light of the vastness of structures, specific actors can be interpreted as having their hands tied. Therefore, it is important to overrate neither the influence of structures nor agency. It is helpful to conceptualize them as opposed but equivalent: treat all structures as generated through agency; treat all agential action as produced through the operation of structures (Powell, 2013).

In face of these debates we acknowledge, firstly, the attempts at bridging structure and agency, secondly, the enabling and constraining qualities of structures, and, thirdly, that the concept of structure is not only blurry but also contested and can be replaced by the term configuration. This paper, however, is not an attempt at contributing to those theoretical and conceptual debates, but rather at identifying and systematizing structural factors asserted in the literature on climate governance and sustainability. In various ways these factors hinder or enable a shift toward lifestyles compatible with climate targets. It is in the nature of a structural perspective to assume that producers and consumers are trapped in certain ways of thinking and doing, and so is climate governance. However, it is vital to note that we do not understand the structural factors we showcase as determining behavior in absolute terms. Indeed, powerful actors' agency also influences structures which, though representing relative stability, are mutable—an understanding without which it would be difficult to address structures politically.

To systematize and evaluate structural impacts, however, further considerations are necessary. Specifically, analyses need to pay attention to the diversity of structural factors addressed in the literature. The blurry nature of the concept of "structure" entails that analyses employ it to describe hugely different phenomena. In a first step, therefore, we have to try to impose some form of order on structural factors themselves. Generally, they can be differentiated according to their dominant context. Economic structural factors tend to relate to markets and trade, political ones to politics and policy regimes, technological ones to infrastructure and socio-technical relations, and societal ones to norms and institutions ordering how individuals interact and relate to each other as well as with the material world in everyday life. There is considerable overlap, of course. Capitalism, for instance, may well be interpreted in a political or an economic context. Thus, these distinctions are made for analytic purposes, yet always to be seen as part of the interdependencies that are intrinsic to the world and the various entangled structural components it is made of.

2.2. Ideational and material factors

A promising starting point for further differentiation is to distinguish between ideational and material structures (Fuchs et al., 2019). This implies paying attention to norms, values and narratives that attribute meaning to actors, actions, and their contexts, on the ideational side, and to the more concrete technological, financial, or procedural phenomena structuring our lifeworld, on the material side. Understandings of what are "normal" production and consumption systems and behaviors, or of what denotes wellbeing and prosperity, are examples of ideational structures influencing the sustainability of consumption and lifestyles. Similarly, narratives can work as structural barriers to transformation when they question the existence of a problem, e.g., climate change, but also when they directly or indirectly delay acting on it (Lamb et al., 2020). The material side involves prices and competition. Households' financial resources tend to have a strong influence on their ecological footprint, for example, and corporate control over markets or technologies similarly shapes the sustainability characteristics of production and consumption.

Of course, most if not all structural factors have an ideational and a material dimension and are linked in various ways (e.g., as part of business models). The distinction between the two is made here for analytical purposes, and allows us to categorize each structural factor according to its more dominant dimension.

2.3. Shallow and deep factors

We suggest a second fruitful differentiation between deep and shallow factors. This distinction reflects our observation that structural factors are ingrained into the societal fabric in very different ways. Some can be rather specific, for example, policy regimes that determine certain subsidies. Others are very broad and fundamental such as capitalism. The depth or shallowness of

3 While external structures are the conditions of action, internal structures consist of both general dispositions (such as discourses, moral and practical principles, attitudes, skills, and values) and conjuncturally-specific knowledge of the strategic terrain, i.e., how to act within external structures (Stones, 2005).

4 Numerous approaches to the concept of structural power exist. Scholars draw on historical materialist and dialectical perspectives (Harvey, 1982; Seo and Creed, 2002), post-structuralist (Foucault, 1980, 2008; Butler, 1990), practice-oriented (Reckwitz, 2002; Warde, 2005), or new materialist (Barad, 2003; Bennett, 2010) theoretical foundations, to name just a few.

structural factors are likely to have an influence on the potential for and sustainability impact of change in these contexts and on our ability to attribute the responsibility for such change to specific actors. Shallow factors, according to our definition then, are more specific and visible, have a narrower focus, and it is easier to identify specific responsible actors able to change them within the current power relations. By contrast, deep factors are broader, less discernible, and more difficult to change, and they potentially cannot be dismantled without changes in existing power relations.

Importantly, shallow is not meant in a derogative way or supposed to suggest that the factors do not exert influence. We use the term mainly as a contrast to the deep factors, the role of which we want to highlight due to the need to reconfigure structural constellations at a systemic level if climate targets are to be met. Moreover, and as with the ideational/material dimension, the distinction between deep and shallow is an analytical device. In reality, it does not exist in this binary form, but rather forms a continuum. The distinction should neither incite all too quick assumptions that deep factors cannot be changed (and therefore a transformation not achieved) nor that the impact of changes in shallow factors will always be small and not worth pursuing.

3. Systematic literature review

In pursuit of our objectives, we combine a systematic literature review on structural barriers and enablers relevant to mainstreaming sustainable consumption and lifestyles with a peer consulting process within the consortium of the EU 1.5° Lifestyles project.[5]

With this literature review, we provide an overview on relevant knowledge in the research field of climate change mitigation and, more generally, sustainability. A first step in a literature review is to reflect on inclusion criteria (Hart, 1998; Xiao and Watson, 2019). We included studies from a variety of social and environmental scientific disciplines, ranging from ecological economics, political economics, environmental politics, sociology of consumption, urban planning, agri-food studies, innovation studies, social and environmental psychology, and business ethics, to sustainable development and transitions studies. All studies involved empirical research relating either to climate change or sustainability in general. We did not include studies (e.g., on climate modeling or descriptive literature on the Paris Agreement) that provide insights on climate change or climate policy without explicitly and empirically addressing wider implications for society. We only included studies written in English or, if they had an international outlook, German.

Relevant articles were identified using different search strings which combined key words linked to the field of sustainability such as "sustainable lifestyles" with "barriers," "enablers" or "structures" and key words from more specific fields (e.g., "technology," "education"). Those search strings were applied to the databases Web of Science and Scopus and, applied in the various possible combinations, yielded a total of 18,188 hits. We reduced the number of hits through screening (only reading the first 200 hits) or using filtering criteria such as excluding studies on "sustainable livelihood" which focus more on farmer livelihoods in the Global South than on sustainable living. Thereby, the number of articles was reduced to ∼1,500 hits and, after removing duplicates, yielded a total of 477 articles. Through abstract screening, the 120 most relevant articles were then selected while categorizing their (apparent) topical focus by structural factors and consumption areas. Of the coded articles, 60 articles were chosen by structural factors (political: 16, economical: 15, technological: 12, societal: 17) and 60 studies by consumption areas (mobility: 16, housing: 14, nutrition: 19, leisure: 11).

The coding process was conducted with the qualitative data analysis software MAXQDA. While reading the articles, researchers used a set of deductive codes to mark text passages that either addressed "structur*" directly or hadan implicit, contextual relevance. The articles were coded for references to the following aspects: political/economic/societal/technological structure, barriers/enablers, ideational/material power, and responsible actors. Next to marking passages with MAXQDA within the studies, all results were entered into a joint Excel sheet. To enhance intercoder reliability, the codes were discussed in the consortium and further described in the coding guidelines. Using the Excel sheet with the summarized articles as a starting point, then, a qualitative analysis of the coded articles was conducted. During the qualitative analysis, the results regarding enablers and barriers were synthesized according to different categories in order to identify meta-structural factors. Narrowing down the findings to a meta-level was useful for getting a good overview on the most relevant enablers and barriers.

In the course of the qualitative analysis, the need for an additional differentiation between types of structural factors became apparent. Thus, we introduced the distinction between deep and shallow factors, which had not been part of the coding process. Yet this distinction allowed us to further order the results from the coding and systematize the diverse angles and scales with which structural factors show up in the literature.

To enable a peer consulting process within the consortium, the main barriers and enablers identified through the coding process were summarized in tables. To distill these tables down to the most important structural enablers and barriers, we applied a ranking survey method (similar to a Delphi process; e.g., Schmidt et al., 2001) drawing on the broad expertise within the consortium. The resulting structural factors are summarized in section 4 and Tables 1, 2.

The method we applied to review the literature and identify impactful structural factors has its limitations. The qualitative interpretation of (particularly indirect) structural contexts by different coders comes with inherent ambiguities, uncertainty about interpretation, and different readings as a result. As pointed out above, intensive discussions within the consortium and detailed guidance on coding was used to reduce this weakness. Similarly, the inclusion of "barriers" and "enablers" as proxy for structural contexts was important to our perspective but also resulted in a large number of search results in combination with the other search terms, which then had to be narrowed down *via* screening and filtering criteria[6]. In addition, our method does not allow

5 onepointfivelifestyles.eu

6 Future re-runs of similar searches may thus result in slightly different samples.

TABLE 1 Key barriers of 1.5° lifestyles: deep structural factors lower and printed in fat, intermediate factors with both deep and shallow characteristics in italics.

Depth	Key Barriers							
	Economic		Political		Technological		Societal	
	Ideational	Material	Ideational	Material	Ideational	Material	Ideational	Material
Shallow		High prices of sustainable commodities, partly due to subsidies for unsustainable commodities and raw materials (e.g., fossil fuels, nuclear power)		Weak policies (ineffective, insufficient) and failure to mitigate and upscale measures	Belief in the future potential of negative-emissions technologies and their use to justify present emissions	(Infra)structural lock-in effects (including centralization of infrastructure systems) impede swift shift from development to implementation of sustainable innovations	Lack of information, knowledge, and skills to adopt sustainable lifestyles	
				Insufficient financial control	Concerns over "geoengineering" lead to neglect of carbon capture options with less adverse side effects (e.g., soil build-up, afforestation)	High and rising energy demand may overburden systems relying on intermittent renewables	Concern about costs of sustainable practices, material insecurity, and lack of convenience	Lack of investment in sustainable social innovations
	Green growth ideology		***Populism and related challenges to democratic governance***	Fragmented political landscape (institutions; mitigation schemes; geopolitics)	Fears of high and rising energy demand overburdening systems relying on intermittent renewables (partly justified, partly resulting from a lack of knowledge)	***Negative effects of digitalization (energy intensity and resource use, drivers of increased consumption, etc.)***	***Narratives of/beliefs in individual self-optimization and competition***	
	Power of marketing (deep and shallow aspects)	**Production precedes consumption; lack of private and public investment in sustainable products etc. due to risk perceptions and expectations on return**	**Ideological lock-in (false optimism; weak analysis of the problem, fear of breaking established political paths/breaking alliances/uncertainty how a new political course will be accepted by electorate)**	**Systematic influence of vested interests: defense of assets, power, and capital accumulation (fossil-fuel incumbency; national geopolitical interests)—instrumental/lobbying, material-structural (and discursive) power**	**Techno-fix attitude and efficiency focus; lack of LCA of technologies (incl. renewables), and false optimism toward techn. progress; neglect of social change/sufficiency-oriented (also to technology) low-tech approaches as mitigation pathways**	**Trade-offs between societal and economic functions if demand for "food, fodder and fuel" is met simultaneously**	***Marginalization of disadvantaged groups and unconventional lifestyles leading to a lack of knowledge about them***	**Efficiency gains outweighed by consumption increase on aggregate (Jevons paradox/rebound effects at multiple levels)**
Deep	**Economic business models relying on fossil fuel industry (backed by powerful political actors)**	**Competition and profitability pressurizing businesses into unsustainable practices**	**Belief in neoliberal governance**		**Focus on satisfying "high and rising" energy demand instead of planning for sufficient levels of energy use**	**The long shadow of previous infrastructure development reveals itself in social practices, institutions, and vested interests limiting policy impact and techn. advances**	**Behavioral focus on lifestyle change (underestimates the nature of change necessary to meet 1.5°C)**	**Social behavior embedded in and dependent on technology and infrastructure**
	Economic growth paradigm institutionalized in social relations, political priorities and valuations	**Globalized markets, enabled by unequal trade relations, which obscure consumption impacts in Global South**				**Material constraints impeding the "greening" of specific sectors (e.g., steel, concrete, synthetic fertilizers)**	**Social conventions and status grounded upon consumption of energy-intensive goods and services, and is reinforced by current political-economic system, and slow to change**	**Work-spend cycle; Praising work and overconsumption related, work justifies high consumption and vice versa**
		Income stability and material welfare depend on growth in production and consumption (in current system)					**Lack of understanding of the severity of the environmental crises, their interaction, and their social dimension (lack of systemic thinking)**	
		Inequality in access to and use of resources as well as in current carbon footprints within and across countries					**Lack of societal vision of a low-carbon society/post-materialist society**	

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TABLE 2 Key enablers of 1.5° lifestyles: deep structural factors lower and printed in fat, intermediate structures with both deep and shallow characteristics in italics.

Depth	Key Enablers							
	Economic		Political		Technological		Societal	
	Ideational	Material	Ideational	Material	Ideational	Material	Ideational	Material
Shallow	Consumer values (leading to demand for sustainable goods as lever of company portfolios)	Economic incentives for production and consumption of sustainable commodities through internalizing costs and subsidies and eco-social taxation (lower tax on labor, higher tax on Carbon emissions and energy use)	Narratives emphasizing benefits of mitigation for societal wellbeing at individual level	Legislation for stable financial incentives fostering predictability and planning safety of investments	Technological advances leading to improvements in energy efficiency	Substitution of resource-intensive practices through digitalisation (e.g., virtual meetings)	Education for sustainability	Niche practices and eco-communities as experimental petri dish for social innovation
		Local and sharing economies		Regulation of public procurement, energy supply and relevant technologies/innovation	Communication on low-tech, easy to implement solutions	"Smart" technologies and analysis tools through digitalisation (caution for rebound effects and overreliance on tech solutions)	Inclusive, participative approach to mobilize knowledge and strengthen acceptance of policy measures	Sustainable practices/infrastructure at community level (e.g., repair cafes)
		Sustainable investment funds and reliable criteria for the sustainability of investment (difficulty: still driving growth)		***Banning of unsustainable products and processes***		Energy storage and flexible use technologies	Alternative narratives linking sustainability practices and individual wellbeing (as part of grassroot initiatives and beyond)	Initiatives mobilizing households to change their everyday habits and practices
Deep	**New measurement of economic success in a post-capitalist societal order focused on a "good life"**	**UBS/public access to minimum levels of essential goods and services (i.e., demonetized access) enabled by societal dialogue on needs and satisfiers (as opposed to UBI)**	**Political will, honesty regarding the crisis, and corresponding "hands-on" style of politics**	**Strong regulation and litigation of supply and demand, physical architecture and infrastructure, corporate practices and subsidies (smart mix of policies needed to avoid shifting burden between dimensions)**	**Systems perspective on technological advances and transformation (incl. changes in societal, economic, and political foundations if necessary)**	**Existence of low-carbon technologies**	**Change in societal values toward collective wellbeing and a "good life," alternative paradigms to work ideology and the morality of work, which underpins consumption as the "good life"**	***Shifts in work-life balance (reduction in working time)— sustainability impact needs to be enabled in general by policy mix (both in terms of overall production and consumption)***
	Economic crises as disruptive factors to the trend of neoliberalism and in favor of counternarratives to overconsumption	**Weakening work-spend cycle (less income, less consumption, but more time for care work, socializing, and leisure)**	**Sufficiency (in combination with justice-) focused narratives as basis for acceptance of strict environmental policies, fostering societal debate**	**Active, more interventionist control over financial system**				
				Strong institutionalization and consensual, concerted efforts from the global to the local level of governance, involving strong participation of citizens and communities				

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to measure the impact of structural factors, it rather gives an indication of their importance by observing that they are (often) asserted in the literature. Both, the application of the Delphi method within our consortium and the expert interviews served to strengthen the reliability of results on the relevance of specific structural factors and to allow the identification of potential gaps resulting from the coding exercise.

4. Shallow and deep structural barriers and enablers

To approach structures, a multiplicity of variables can be distinguished. Here, we present structural factors that recur in the literature and are thus impactful regarding shifts toward sustainable lifestyles. However, the ways in which their impact manifests diverge. Thus, we first present barriers and then enablers. While we are well-aware that they are two sides of the same coin as overcoming a barrier can be seen as an enabler, it still matters whether the perspective taken is inclined toward problems or solutions. Within the following subsections, we also separate between structural factors at the shallow (4.1 and 4.3) and deep (4.2 and 4.4) level. The additional distinction between material and ideational also appears without constituting its own subsection. An overview of all variables is provided in Tables 1, 2, showing key barriers and enablers, respectively.

4.1. Shallow barriers

Barriers that could be changed by a manageable number of actors without significantly overturning power relations can be seen as "shallow." Policies are a political structural factor referenced most frequently in the literature, with scholars emphasizing that weak policies form a major barrier to transformation (Larsen et al., 2011; Antal and van den Bergh, 2014; Grosjean et al., 2016; Mercure et al., 2016; Spash, 2016; Beck and Mahony, 2018; Gunderson et al., 2018; Henders et al., 2018; Jackson and Smith, 2018; Mathy et al., 2018; Gossen et al., 2019; Anderson et al., 2020; Chan et al., 2020; Somerville, 2020; Streck, 2020; Brand, 2021). Practical examples of policy weakness include loopholes that allow jurisdictions to externalize footprints and meet (their individual) targets by importing rather than producing resource-intensive commodities. Celebrated initiatives such as the Nordic Energy Transition ignore emissions from aviation and shipping (Anderson et al., 2020; Chan et al., 2020; Somerville, 2020). Similarly, researchers regard the Paris Agreement, with its voluntary nationally determined contributions, as insufficient in its promises of climate security (Spash, 2016).

For shallow economic structural factors, the most recurrent material barrier in the literature is about pricing. Scholars frequently highlight that the prices for products and services are unbalanced, with sustainable alternatives generally being more expensive. This is the case for the mobility sector (high prices for alternatives to conventional fuels) (Bakker et al., 2014; Cavoli, 2021), renewable energies (Kuokkanen et al., 2016) or the food sector (Rossi et al., 2019). In some cases, this problem arises from continued subsidies for unsustainable commodities and raw materials (Kirchherr et al., 2018). We categorize product prices as something that could be addressed through existing measures at the shallow level, e.g., specific tax policies. Generally, however, low prices are a function of the externalization of environmental and social costs of production. Cheap labor and exploitation, environmental sinks and degradation are costs not paid by consumers in the Global North but elsewhere as part of unequal exchange between North and South (Dorninger et al., 2021). The resulting prices discourage individuals, companies and (local) governments from making more sustainable choices (Birch, 2016). Those North-South inequalities are *deeply* embedded into the fabric of society (see Table 1).

Shallow technological barriers comprise beliefs in and reliance on the future potential of certain negative-emissions technologies, including so-called "geoengineering." However, academics have warned that rejecting all negative-emissions technologies out of justified concerns over geoengineering bears the risk of neglecting carbon capture options with less adverse side effects such as soil build-up and afforestation (Cox et al., 2020). Another barrier entails that a high and rising energy demand may overburden systems relying on intermittent renewables (Ilieva and Bremdal, 2020) which is at the same time a material barrier and an ideational one since concerns over this are partly justified in the face of the material status quo of renewable infrastructure, partly resulting from a lack of knowledge over alternatives. Infrastructural lock-in effects (including centralization of infrastructure systems) impede a swift shift from development to implementation of sustainable innovations (Bakker et al., 2014; Birch, 2016; Ruhrort, 2020).

Finally, shallow material and ideational factors in the societal realm also constrain the sustainability of consumption and lifestyles. Individuals may lack clear information on how to implement sustainable behaviors into their daily practices or an understanding of (the urgency of action on) climate change and reducing one's footprint (Abrahamse and de Groot, 2013). This is not least a question of insufficient education, as climate change still enjoys too little coverage in the education system (Otto et al., 2020).

A handful of structural factors can be categorized at the intermediate level between shallow and deep (in Tables 1, 2 they are printed in italics). These are barriers that could and should be addressed by specific measures but are rooted in deeper structures that are not easy to change. The predominance of a green growth ideology, the continuous power of marketing over consumption, populism and related challenges to democratic governance, the often unquestioned negative effects of digitalization, narratives of individual self-optimization and competition, and the marginalization of disadvantaged groups and unconventional lifestyles leading to a lack of knowledge about them. While specific measures and responsible actors may be identified for these aspects, these structural factors also highlight that some of them are more difficult to grasp as they have causes at the deep structural level which is detailed in the following subsection.

4.2. Deep barriers

Barriers that are deeply ingrained into the fabric of society are less discernible, more difficult to change, and not without changing power relations.

While policies, in the end, form material factors, they are, of course, closely associated with norms and ideas, especially specific conceptions of problems, solutions, or relevant actors. This is where the powerful role of deeper material and ideational factors behind the specific policies becomes visible. These deeper factors determine what policies are even considered and whether they have the chance to be effective rather than weak.

At this deeper level, the literature identifies power asymmetries between political actors as a crucial material barrier to change. Such asymmetries exist between well-organized, resource rich, profit-oriented economic actors or political elites, on the one side, and citizens, on the other, but also between large and small businesses, between resource rich and poorer segments of the global population, and between current and future generations (Grosjean et al., 2016; Czirfusz et al., 2019; Somerville, 2020; Brand and Wissen, 2021). Scholars highlight the institutionalized influence of vested economic interests in the political process (Birch, 2016; Echeverri, 2018; Schaffartzik and Fischer-Kowalski, 2018; Ruhrort, 2020; Somerville, 2020; Newell and Simms, 2021). More fundamentally, they underline the general role of money in politics, both in its "legal" form of lobbying, sponsorship, and campaign finance, but also in the form of corruption as crucial material barriers (Antal and van den Bergh, 2014; Streck, 2020). On the ideational side, the literature raises alarm over a lack of knowledge of relevant dynamics, pointing also to pervasive misinformation on climate change (Antal and van den Bergh, 2014; Streck, 2020). As a result of such barriers, the literature suggest, climate governance has turned into "a lop-sided, elite-biased liberal proceduralism doomed to failure in the face of changes of a scale and scope hitherto unimaginable" (Somerville, 2020, p. 356 citing Wainwright and Mann, 2013, p. 9).

Furthermore, the hegemony of the growth paradigm remains a dominant ideational barrier to politicians' willingness to pursue changes to the economic and social order (Spangenberg, 2013; Antal and van den Bergh, 2014; Bakker et al., 2014; Spash, 2016; Gunderson et al., 2018; Fletcher et al., 2019; Gossen et al., 2019; Anderson et al., 2020; Brand et al., 2020; Brand, 2021; Pichler et al., 2021). This includes the presumption that growth is progress, its absence leads to instability and recession, and that growth is necessary to preserve jobs and the welfare state (Antal and van den Bergh, 2014). Incompatible with an absolute reduction of resource use (Spash, 2016; Pichler et al., 2021), this logic puts environmental goals second, thereby stabilizing unsustainable living standards while ignoring the risks of resource extraction, the opportunities in controlled degrowth, as well as alternative ways to create jobs or configure welfare (Brand, 2021).

A substantial share of the literature emphasizes that enacting transformative change in the context of sustainable consumption and lifestyles will require an openness to actively regulate the demand for products and services (Henders et al., 2018; Jackson and Smith, 2018; Mathy et al., 2018; Ruhrort and Allert, 2021; Stankuniene, 2021). In the past, such "regulation" was confined to specific, rather passive (i.e., shallow) policies and approaches, typically focused on informing consumers, raising awareness among them, and encouraging them to take individual responsibility (Fuchs and Lorek, 2005). Moreover, it has aimed at the greening of consumption and its growth rather than absolute reductions. Recognizing the shortcomings of individualist approaches, many contributions in the literature emphasize the importance of *collective* mitigation schemes and associated changes in social practices. Energy communities contribute to a decentralized energy system, relevant public procurement and city-level schemes, more public spaces, and a better mobility infrastructure (Larsen et al., 2011; Mosannenzadeh et al., 2017; Schaffartzik and Fischer-Kowalski, 2018; Wamsler and Raggers, 2018; Gossen et al., 2019; Sareen and Grandin, 2020; Cunha et al., 2021; Ruhrort and Allert, 2021). The broad failure of weak sustainable consumption governance asserted in the literature suggests that active political demand-side regulation will necessitate addressing broader political and social norms as well as material factors at the deeper level. Such a deep structural focus would, for instance, allow if not force politicians and societies to question the role of the advertising sector, structural factors and processes that foster status competition, work-spend cycles, and multiple-scale inequities in provision and appropriation of value. A depth-based approach would rethink the value of growth and restrict the influence of vested interests benefiting from growth, but also create new avenues for equitable and inclusive sustainability governance (Daly, 2013; Büchs and Koch, 2019; Brand and Wissen, 2021; Keil and Kreinin, 2022).

Again, deep material and ideational factors shaping the sustainability of consumption and lifestyles shine through the structural barriers at the surface of economic conditions (e.g., prices of sustainable commodities; see 4.1). It is important to note that as well as switching to more sustainable alternatives, consumption needs to be reduced overall in line with ideas of sufficiency (see 4.4; Schaffartzik and Fischer-Kowalski, 2018; Somerville, 2020). However, the capitalist logic means that companies seeking profit and unsustainable demand from households are institutionalized *via* private ownership or capital accumulation in current politico-economic and social relations (Spangenberg, 2013; Gunderson et al., 2018). They are supported by a monetary system highly efficient in fostering this capital accumulation and pursuit of economic growth, as well as by the deep inequalities inherited from the colonialera.

In this context, the literature identifies the continued reliance on fossil fuels as a further material barrier to the transition to sustainable energy use (Messner, 2015; Otto et al., 2020; Brand, 2021; Schaffartzik et al., 2021). Current economic business models and even research, education and innovation policies still attribute an important role to fossil fuels (Messner, 2015), along with continued investment in fossil-fuel assets in financial markets (Otto et al., 2020). Even today, the fossil energy system remains attractive for financial institutions, because it offers safe long-term assets and is not exposed to strong competition, authors argue (Schaffartzik et al., 2021).

Unsustainable levels of consumer demand create an additional deep material barrier to transformation (Spangenberg, 2013; Ertekin and Atik, 2015; Gossen et al., 2019; Jensen and Friis, 2019; De Rosa et al., 2021; Ruhrort and Allert, 2021). Research links this barrier to the capitalist logics mentioned above, insofar that overconsumption is production-driven, with products and services, and specifically advertising artificially creating perceived wants and needs (Gossen et al., 2019). However, some scholars argue that

consumers also rather willingly pursue maximum consumption levels and frequently refuse to pay more for higher quality or circular products (De Rosa et al., 2021). A prominent example for this is the fashion industry with its high demand for cheap clothing and fast fashion (Ertekin and Atik, 2015). This unsustainable consumer culture is also related to capitalist economic logics, however. Individuals are encouraged to pursue "self-optimization" through high-level consumption and *via* societal factors enhancing time pressures and status competition, including long work-hours (Ruhrort and Allert, 2021; Keil and Kreinin, 2022).

When it comes to technology, it is important to differentiate between the role of individual technologies and the deeper material and ideational factors behind technology use and development. The long shadow of previous infrastructure development reveals itself in social practices and institutions, thereby structurally limiting the immediate policy impact—and thus transformational potential—of technological advances (Bakker et al., 2014; Birch, 2016; Kuokkanen et al., 2016), which may also be impeded by the power of businesses preserving the status quo (Spash, 2016). The literature also highlights the risk that improvements in the energy efficiency of products and processes are associated with rebound effects, i.e., the "Jevons paradox" or the risk that efficiency gains will not translate into absolute reductions in carbon emissions, but be leveraged to increase output (Gunderson et al., 2018).[7]

Moreover, technologies themselves imply material constraints and thereby influence transformation trajectories. Some existing industrial processes and products (e.g., steel, concrete, synthetic fertilizer) cannot currently be "greened" through the use of renewable electricity sources, due to the fundamentally different energy properties of fossil vs. renewable energy sources (Malm, 2013; Hoffmann and Spash, 2021).[8] Thus, an "easy" switch in energy sources is not possible, and a transformation would involve decisions about the reduction or phase out of certain processes, ideally in conjunction with broader degrowth and sufficiency strategies (Somerville, 2020; Pichler et al., 2021). Changing the physical infrastructure and productive capacity of society and the economy is anyway necessary to comply with the physicality behind the global carbon budget (Anderson et al., 2020). Similarly, the utilization of renewable resources such as biomass is potentially limited by constraints on production if demand for "food, fodder and fuel" must be met simultaneously, as well as due to concerns about biodiversity loss (Potrc et al., 2021).

At the same time, deep ideational factors also play a crucial role in the context of technology. For example, the hope placed in innovationis a fundamental part of the problem and distraction from environmental (and social) policy progress. "Techno-optimist" perspectives usually highlight the efficiency potential of new, "clean" or "smart" technologies. The critical perspective, in contrast, underlines that technology itself often requires vast amounts of materials and energy, with many "green technologies" having high life-cycle emissions (Ayres and Warr, 2009; Keen et al., 2019). Moreover, ideas about the future practical deployment of many of these technologies are of speculative nature (Anderson et al., 2020; Cox et al., 2020; Somerville, 2020). More fundamentally, techno-optimism impedes societal and political change (Beck and Mahony, 2018) by narrowing policy makers' focus and conditioning societal norms and expectations against effective action toward sustainable consumption and lifestyles (Fletcher et al., 2019). Technological innovation legitimizes a restricted focus on environmental protection by being framed as an economic opportunity, creating the promise of green growth, and enabling the rejection of alternative social futures as well as sufficiency-based policies toward them (Loorbach et al., 2016; Gunderson et al., 2018; Streck, 2020).[9]

How ideational and material factors interact can be seen most easily in governmental and industry decisions on what research to fund (Mathy et al., 2018). But the interaction is even more intricate and nuanced, as the potential attributed to renewable energy sources shows. On the material side, substituting fossil energy with wind and solar energy, for instance, can be seen as a challenge in the context of the inherent intermittency of these renewables due to weather conditions. In this context, the literature highlights concerns that the power grid may be overburdened if energy production exclusively relies on renewables, in the face of persistently high and rising energy demand (Ilieva and Bremdal, 2020). However, such concerns are also influenced by ideational frames. Superficially, insofar as possibilities to overcome the challenges of intermittency may well exist (see 4.1). More fundamentally, the assumption of a rising energy demand need not be made. After all, demand could be curbed, simultaneously, *via* degrowth and sufficiency approaches.

A deep structural perspective on societal change questions the effectiveness of providing individuals with information on sustainable consumption alone. Even well-informed citizens often perform unsustainable consumption (Abrahamse and de Groot, 2013). Lowfinancial resources of households may make high-priced ecological products unattainable (Gossen et al., 2020; Raven et al., 2021). High financial resources tends to result in excessive overall consumption rates. Consumption is associated with households' concrete living and working conditions, including aspects such as family size, space, and time. Moreover, scholars underline that individuals and households are deeply embedded into specific understandings of social value and habitualized conventions of consumption. Conventions and practices underpin a persistent demand for energy-intensive goods and services, including the growing frequency of carbon-intensive consumption such as travel (Fletcher et al., 2019; Jensen and Friis, 2019). Unsustainable

7 According to some scholars, this concern can be attenuated to some extent with the implementation of regulatory policies to incentivize private enterprises to innovate within specific guardrails (Martek et al., 2018; Chan et al., 2020).

8 Many current industrial processes are reliant on fossil fuels as inputs, for example, due to the heat properties of highly energy dense fossil fuels.

9 The increased reliance negative emissions technologies (NET) in climate models and mitigation strategies illustrates this optimistic perspective well, insofar their actual potential is highly speculative and associated risk assessments raise considerable alarm (Anderson et al., 2020; Somerville, 2020). The potential for carbon removal in the future suggested by NETs distracts from the immediate concern to prevent emissions in the first place and enables governments and companies to promise successful long-term mitigation while planning with continued fossil fuel emissions in the medium term (Cox et al., 2020).

consumption is also an important component of social demarcation or status competition. Individuals pursue status stabilization and distinction through consumption, e.g., *via* car ownership or fashion products (Ertekin and Atik, 2015; Cavoli, 2021). As part of the neoliberal social and economic order, individuals are constantly subjected to inter-individual competition and self-optimization, for which they typically require high consumption rates (Gunderson et al., 2018; Brand, 2021).

4.3. Shallow enablers

Faced with the broad variety of barriers, it is even more important to elucidate how the literature depicts solutions. Enablers range from beneficial structural factors that already exist to potentially beneficial ones.

Going back to the shallow structural level in an economic context, it is important to reduce prices of and increase willingness to purchase sustainable commodities. There is a need for legislation for stable financial incentives fostering predictability and planning safety of investments (Echeverri, 2018; Palea, 2021; Sovacool et al., 2021). Furthermore, there are levers that already exist and are relatively easy to trigger for regulating public procurement, energy supply and relevant technologies or innovations (Rootzén et al., 2020; Balázs et al., 2021). And to create acceptance of mitigation measures, political narratives often emphasize collateral benefits for societal wellbeing at individual or collective level (Druckman and Gatersleben, 2019; Creutzig et al., 2022).

Going beyond the question of pricing in the economic context, scholars argue that strong consumer demand for sustainable goods and services would be an important enabler of change. Importantly, they perceive this demand to be growing (Arslan et al., 2021; Saari et al., 2021), such as in the case of plant-based products (Tziva et al., 2020). Though rising, one has to acknowledge that, currently, the demand for sustainable products and services is still far from overpowering the demand for unsustainable ones. What is needed to improve provision are sustainable investment funds and reliable criteria for the sustainability of investment. Another argument is that alternative economic narratives are strengthened through the disruptive effects of crises during which neoliberal norms, for example, are at least temporarily questioned (Hicks and Kuhndt, 2013; Loorbach et al., 2016; Pichler et al., 2021).

Shallow material technological factors include technologies and infrastructure on the demand and supply sides. On the demand side, advances in the energy efficiency of household appliances enable reductions in the carbon footprint of everyday life, while the availability and affordability of technologies such as heat pumps can improve the energy efficiency of housing as such (Hards, 2013). On the supply side, improvements in power grids, energy storage and the introduction of flexible local markets (Ilieva and Bremdal, 2020) to accommodate discontinuous cycles of energy generation from renewable sources can foster improvements in the energy efficiency of production (Mathy et al., 2018).

In recent years, digital technologies receive particular attention in the literature, both in terms of their potential to reduce energy use, but also in terms of their own ecological and social costs. Digitalization can allow employees to work remotely from home, alleviating the need for commuting and (air) travel (Bakker et al., 2014; Kanda and Kivimaa, 2020). Digital devices and "smart" technologies can also help individuals and businesses tracking the carbon impact of consumption practices, including work-related travel (Pargman et al., 2020) or minimizing energy waste of refrigerators and other appliances (Jensen and Friis, 2019). At the same time, digitalization itself is associated with significant energy use, for instance, for searching, streaming, and storage (Chen et al., 2020).

In the societal context, scholars frequently identify education as an enabler for lifestyle changes (Abrahamse and de Groot, 2013; Hicks and Kuhndt, 2013; Longo et al., 2017; Perkins et al., 2018; Gossen et al., 2019; Manca and Fornara, 2019; Jacobson et al., 2020; Otto et al., 2020; Balázs et al., 2021; Brand, 2021; Eker et al., 2021; Schaffartzik et al., 2021). They suggest that educating citizens on sustainability—at school, through professional training, or awareness campaigns organized by governments or civil society[10]—can lead to individual value and behavior change. In this logic, awareness campaigns play an important role in educating adults, e.g., on topics such as meat consumption (Hicks and Kuhndt, 2013; Balázs et al., 2021) or (international) environmental and climate policies (Brand, 2021; Schaffartzik et al., 2021). Similarly, organizing challenges or providing feedback on consumption, e.g., through monitors or meters, can be incentives to change everyday habits, in the view of some authors (Stankuniene, 2021). For education and awareness campaigns to be successful, however, the research suggests that information should be inclusive, tailored to specific audiences (Manca and Fornara, 2019), focus on daily challenges and routines (Longo et al., 2017), and consider the beliefs and practices of the targeted audience (Perkins et al., 2018). Some alternative narratives, for example as part of grassroots initiatives, link sustainability practices and individual wellbeing.

Some shallow structural enablers in a societal context are rather material. Niche practices and eco-communities can be seen as an experimental petri dish for social innovation (Manzini, 2013; Mont et al., 2014). Founded amidst wider public debates on sustainability, specific initiatives mobilize households to change their everyday habits and practices. This comprises "endangered" sustainable practices and infrastructure at community level such as repair cafes (Ehgartner and Hirth, 2019). However, these practices and initiatives can be considered as shallow because they often implicitly seek to optimize behavior of individuals only and lack momentum and support to be upscaled toward collective mass adoption.

Other structural factors are intermediate in that they could be addressed by specific policies or other measures but there may be deeper factors impeding change. Banning of unsustainable products and processes, for example, would be possible with various measures but in the wider political climate regulating and limiting individual behavior is avoided. Similarly, shifts in work-life balance could be enabled but face constraints through deep economic structural factors.

10 The literature suggests benefits of increased collaboration between educational institutions, such as schools and universities, with communities, in this context, specifically as a to provide education for sustainability to a wider public (Perkins et al., 2018).

4.4. Deep enablers

Enablers at the deep structural level shatter the societal norms and underlying power relations. To address the latter, scholars point toward strong political will as a (potential) enabler and "hands-on" policies that involve active regulation (Spangenberg, 2013; Henders et al., 2018; Jackson and Smith, 2018; Roberts et al., 2018), flexible and less fragmented policies (Mathy et al., 2018; Wamsler and Raggers, 2018), policies aiming at sufficiency and justice (Schaffartzik and Fischer-Kowalski, 2018; Wamsler and Raggers, 2018; Somerville, 2020; Stankuniene, 2021), and, in general, a stronger institutionalization of sustainability and climate governance (Larsen et al., 2011; Roberts et al., 2018; Chan et al., 2020; Pastukhova and Westphal, 2020; Brand, 2021). More fundamentally, they argue that more stringent legislation is needed to enforce moratoria or bans of certain behaviors or sectors, e.g., advertising (Otto et al., 2020; Somerville, 2020), or pursue a socially just phase-out or phase-down of resource intensive technologies, behaviors, and sectors (Prinz and Pegels, 2018; Somerville, 2020; Pichler et al., 2021). Effective litigation of unsustainable practices and ecocide (Chan et al., 2020; Otto et al., 2020) and more attention to financial responsibility for governance and its intended outcomes (Pastukhova and Westphal, 2020) would also be enablers of change. Financial tools such as tax (dis)incentives directed at households and businesses, and the shifting of subsidies away from fossil fuels and toward renewables, are also part of the toolset discussed (Kirchherr et al., 2018; Chan et al., 2020; Otto et al., 2020; Rootzén et al., 2020; Somerville, 2020).

Deep change also involves shifting control as well as societal dialogue about broader political and social norms. In this context, scholars argue that stronger participation in climate governance through a wide range of actors, including grassroots initiatives, unions, and energy communities and citizens more broadly can facilitate necessary social innovation (Manzini, 2013; Mont et al., 2014; Prinz and Pegels, 2018; Cunha et al., 2021). Such involvement may be provided for stronger individual (Ruhrort and Allert, 2021) or public participation (Sareen and Grandin, 2020), e.g., in the context of urban governance and energy cities (Mosannenzadeh et al., 2017). Importantly, however, such approaches will only make a difference if they really focus on overcoming power asymmetries (Brand and Wissen, 2021), implement a real shift in control, including the empowerment to shift lifestyles (Jackson and Smith, 2018), rather than shallow performances of participatory sustainability governance. This may require the creation of spaces not only for participation but also deliberation (Larsen et al., 2011), as well as of practical avenues for integrating the outcomes of such processes with the institutions and processes of representative democracy (e.g., democratization through energy communities; Cunha et al., 2021).

When it comes to enablers on the deep, ideational side, the research points to the necessity of a broader vision and frame for possible action that includes attractive and convincing concepts and narratives (Spangenberg, 2013). Specifically, scholars suggest highlighting the positive impact of climate governance on social stability and wellbeing (Gunderson et al., 2018), jobs and security (Roberts et al., 2018), food security (Zurek et al., 2018), reductions in energy poverty (Cunha et al., 2021), and public health (Roberts et al., 2018), for instance due to healthy diets (Hicks and Kuhndt, 2013), or healthier mobility patterns (Jensen et al., 2017).

In the economic context, deep ideational factors also play an important role. Shifts in social and cultural norms and values toward a post-capitalist order are suggested (Spangenberg, 2013; Bakker et al., 2014; Messner, 2015; Gunderson et al., 2018). Along with those changes, what is needed are alternatives to material wealth as a definition of prosperity and to economic growth as an indicator for the success of a country and its economic system and government. Scholars argue that social development, happiness, deeper considerations of what makes a good life, and the imperative to acknowledge ecological limits need to become fundamental economic and societal norms, instead (Bakker et al., 2014), and they see ongoing and future financial and ecological crises as a potential source of mobilization in that direction (Otto et al., 2020; Brand, 2021). They point out that the financial crisis in 2007 and 2008 led to more policy intervention in the economic system, thereby partly disrupting the trend of neoliberalism at the deep structural level (Pichler et al., 2021) as well as facilitating the dissemination of counternarratives to hyper-consumption such as the values of frugality and community (Hicks and Kuhndt, 2013; Loorbach et al., 2016).[11]

On the material side, initiatives that establish a local economy or a collaborative and sharing economy can be qualified as deep enablers. While small initiatives of this kind individually will hardly challenge capitalist logics in global markets, they can grow in size and number. Local economies can cover several sectors, e.g., the food sector through alternative food networks and community-supported agriculture (Bui et al., 2019; Koretskaya and Feola, 2020), the fashion industry (Ertekin and Atik, 2015), but also the energy sector by implementing flexible markets in local energy communities (Ilieva and Bremdal, 2020). While those initiatives take many forms, e.g., food sharing, carpooling, upcycling, and repair cafés, they often share a focus on use and access rather than ownership (Hicks and Kuhndt, 2013; Pirgmaier and Steinberger, 2019; Ruhrort, 2020). This may also strengthen the power and resilience of communities and foster collective wellbeing (Schulz et al., 2019; Kanda and Kivimaa, 2020).

Dissociating provision from markets is a second approach to sheltering economic interaction and societal wellbeing against capitalist pressures. Public access to a greater number of goods and services would decouple the standard of living from monetary income (Spangenberg, 2013). Amongst other things, this involves weakening the work-spend cycle. The work-spend cycle refers to the historic pattern of using labor productivity gains to increase (over)consumption rather than leisure time. Long working hours, destructive in themselves due to environmental impacts of work, both justify, and are justified by, increasing levels of (over)consumption (Schor, 1991; Keil and Kreinin, 2022; Kreinin and Aigner, 2022). Moreover, the provision of universal basic services would allow a focus on needs satisfaction and sufficient, rather than growing, production and consumption (Gough, 2017; Fuchs et al., 2021b). Public financing does not mean that

11 Other scholars, however, have argued that the financial crisis strengthened capital concentration and led to a stabilization of the system (Scherrer, 2011).

addressing the question of pricing within markets, i.e., ensuring the internalization of environmental and social costs, would not be necessary and beneficial. They show, however, possible avenues for also targeting the deeper economic factors shaping the sustainability of consumption and lifestyles.

To change behavior deeply ingrained in society, it is important to mobilize households to change their everyday habits, rather than simply inform them about how to reduce their energy consumption (Longo et al., 2017). This involves challenging certain social standards and expectations, e.g., about home-heating or laundry (frequency, etc.) (Jensen and Friis, 2019). At a more fundamental level, strengthening the sense of place and human-nature connectedness also fosters pro-environmental behavior (Grenni et al., 2019; Riechers et al., 2021). In consequence, a substantial share of the literature suggests changes in broader societal norms and values, such as ideas about a successful and happy life, visions of collective wellbeing, and questioning the current focus on growth and materialistic values (Støa and Aune, 2012; Abrahamse and de Groot, 2013; Manzini, 2013; Bakker et al., 2014; Mont et al., 2014; Shirani et al., 2015; Andersson and Rahe, 2017; Mock et al., 2019; Otto et al., 2020; Morrow, 2021; Tröger and Reese, 2021). To this end, authors promote a focus on cognitive support (Abrahamse and de Groot, 2013), community building and self-sufficiency (Mont et al., 2014), grassroots initiatives providing a supportive normative context and counter-narratives (Gossen et al., 2019; Vita et al., 2020), or consumers becoming an active part in the shaping of supply chains as prosumers (Campos et al., 2020). Community structures and projects foster relationships based on reciprocity, redistribution and participation, e.g., sharing circles or urban gardening initiatives (Hicks and Kuhndt, 2013; Tröger and Reese, 2021), and allow individuals to experiment with non-mainstream lifestyles (Shirani et al., 2015). Grassroots initiatives and community building can also lead to a higher life satisfaction due to a gain in social capital, a sense of empowerment, and agency, which can diminish the need for consumption or building economic capital (Broadbent and Cara, 2018; Gossen et al., 2019; Vita et al., 2020). The hope is that *via* these means change could be provoked and pressure to the existing "regimes" applied (Mock et al., 2019). Eventually, currently dominant narratives could change into degrowth-oriented ones, built on the idea of a good life without a focus on artifact-based material prosperity (Manzini, 2013; Tröger and Reese, 2021; Keil and Kreinin, 2022).

5. Discussion

Distinguishing structural barriers and enablers that are material or ideational, deep or shallow brings some clarity into the way we look at structures. Specifically, it allows us to systematize structural factors that are impactful regarding the potential for sustainable consumption. Our results can show both differences in terms of how deep relevant structural factors permeate the fabric of society and the challenge (and at the same time relevance) of changing them.

Lifestyle changes toward sustainability are hindered or facilitated through structures at the *shallow* structural level. This includes material barriers such as unbalanced prices of commodities and lack of investment in sustainable alternatives; weak policies and control as well as institutional fragmentation; and lock-in effects regarding infrastructure and energy systems. Ideational aspects include fears over shortcomings of renewable energy systems (while not considering the possibility of reducing energy demand) as well as speculative reliance on specific negative-emissions technologies (while neglecting less adverse carbon capture options based on natural solutions). By contrast, material enablers are economic (dis)incentives; reliable criteria, funds, and legislation for investment; incentives for local and sharing economies; regulating public procurement; digitalization and "smart" technologies; energy storage and flexible use technologies; and sustainable niche practices, communities, and initiatives mobilizing individual lifestyle changes. These are complemented by ideational enablers focused on consumer values; narratives linking sustainable practices to collateral benefits and wellbeing of individuals; hope in either technological advances or easy to implement low-tech solutions; information and education; and acceptability as premise for mitigation measures.

We categorized those barriers as "shallow" because they could be addressed by specific policies that would be in reach of (or are even pursued by) influential actors without significantly challenging the current power relations. By tendency, "shallow" enablers are economistic (growth inducing solutions), technocratic, and appeals to individual action and responsibility rather than collective, systemic change. This does not mean they are not worth pursuing or ineffective—they may well be effective in aggregated form. However, they tend to be the most common form of considered mitigation measures while (1) it seems unlikely that climate targets can be reached with shallow enablers alone and (2) their implementation may distract from deeper systemic changes.

Importantly, therefore, our analysis also unearthed barriers *deeply* ingrained in the fabric of society. These are material such as the focus on globalized markets and financial return, obscuring impacts of consumption in the Global South; general inequality in access to and use of resources; systematic influence of vested interests; infrastructure and sectors locked-in through individual vested interests but also material constraints to "greening"; and trade-offs between societal and economic functions (food, fodder, fuel). Other deep barriers are ideational such as the subordination of any activity (incl. mitigation) under the pursuit of economic growth driven by ideas of progress; the power of marketing; business models' continued cognitive reliance on fossil fuels; ideological lock-in that leads to weak understanding of the crisis, its depth and severity, further constrained through presumptions about acceptability and belief in neoliberal governance; predispositions to meet high demand through techno-fixes rather than lowering it to sufficient levels; behavioral focus on lifestyle change; and unquestioned conventions that ground social status in (over)consumption, illustrating the lack of a societal vision for a low-carbon society.

The relevance of *deep* structural factors, in particular, and underlying power relations is already—and at least implicitly—part of debates on the failure of climate governance in the past decades (e.g., Stoddard et al., 2021 for a comprehensive overview). Our review has made the differences in the nature of shallow and deep, as well as material and ideational, factors more visible and explicit. This is in line with the frustration about the status quo of food systems exhibited by a majority of consumers, which

results not only in considerable rates of openness and efforts toward behavior change but, for some, also in a strong desire for structural changes beyond their own control and established power relations (Hirth et al., 2022). That desire, however, is largely ignored by economic and political elites focused, at best, on shallow measures. Differentiating between shallow and deep factors elucidates the divergence between prevalent discussions about the comparatively shallow factors associated with specific policies and the neglect (in governance) of deeper structural forces that determine whether and what policy options are even considered. While the focus on the shallow level dominates much of political and public debate, deep structural factors such as the power of vested interests, the role of money in politics in general, and the reasons for fragmented and weak policy responses remain obscure. Thereby, the set of political choices becomes severely constrained and excludes a broad range of alternative, likely more effective, interventions in pursuit of sustainability transformation.

The neglected status of deep structural factors may bring to mind Anderson et al.'s (2020) insistence that the current crises require policies at least at the scale of the "Marshall Plan" or beyond, including broad changes to the organization of the productive capacity of society and the economy and its physical infrastructure. However, even changes to productive capacity and physical infrastructure are far from enough if this does not explicitly address deep material factors such as the obstructive control of the social and economic order by financial and political elites; as well as ideational factors such as the norms and values based on growth, extractivism, and cost externalization which are in the way of narratives and approaches based on degrowth, sufficiency, and a "good" life.

There are some limitations to our perspective, of course. First, the distinctions made, both between material and ideational and between deep and shallow, are analytical distinctions. As pointed out above, most structural factors have ideational and material dimensions, with one of them tending to be more dominant. Similarly, the binary nature of the deep-shallow distinction is an analytical simplification, as many factors lie somewhere on the continuum between deep and shallow.

Secondly and perhaps more fundamentally, our systematization of ideational and material, deep and shallow factors in the economic, political, societal, and technological realms should not be understood to negate the fact that, ultimately, all structural factors are related. Further research could elaborate on the ways in which specific structural factors interact, and thus on how to compose feedback loops resulting in changes at the deep structural level. Yet, we hope that the above systematization will help to convey what a "concerted effort" would require, and that overcoming established power relations, normalized practices, unequal and excessive resource access, stifled "debates," tokenized "action," and toothless political institutions would be part of that effort.

Thirdly, assessing the influence of structures is a challenge. Relating structures to concrete impacts on consumption behaviors or outcomes is difficult. The influence of structures tends to be broad and subtle, and this is even more the case for deeper structural factors. Their influence is rarely deterministic and interacts with the influence of other factors. Still, politicians, in particular, will always want to know the likely impact of a suggested structural change. However, the complexity and deep uncertainty make the quantification of structural impacts difficult, while conversely, being able to model the effects of changes on the sustainability of structures offers new pathways for transforming societies and understanding interrelations between different structures. Social scientists have been right to criticize and caution against simplistic and positivist pushes for quantification, so-called "simple empiricism" (and especially financialization including cost-benefit-analyses), which have swept the social science and policy making (Spash, 2014). Though only offering one snapshot of possible realities, quantification can nevertheless provide useful signposts to estimate the effects of certain structural factors on (un)sustainable outcomes.

Importantly, some structural factors and their impacts on the sustainability of consumption are easier to quantify, or have already been quantified, such as changes to the energy mix or existence of low-carbon technologies. Other factors and impacts are extremely difficult to quantify. Inequity in resources, resource use and power is—despite of available data on wealth and income inequality—hard to measure since structural power cannot be equated with capital alone. Similarly, (the impacts of) barriers such as the economic growth paradigm, global competition, and unequal North-South trade relations as well as enablers such as strong institutionalization and justice and limits-focused narratives and norms all provide a huge challenge to quantification attempts. Clearly, more research is needed to help overcome these challenges.

6. Conclusion

There is already a rich base of knowledge on the importance of structural change for the sustainability transition in general and the sustainability of consumption and the mainstreaming of 1.5° lifestyles, more specifically. Yet, the breadth and diversity of types of structures discussed in the literature make a systematic understanding of structural barriers and enablers difficult. Therefore, this article identified impactful structural factors that recur in the scientific literature and systematized them by their material and ideational, shallow and deep nature. Shallow factors can be addressed by specific policies that would be in reach of (or are even pursued by) influential actors without significantly challenging the current power relations. They are compatible with current power relations because they tend to support the pursuit of (green) growth, focus on technological efficiency and innovation to avoid unpopular practice changes, and they appeal to individual action and responsibility rather than broader political intervention in pursuit of structural change. Pursuing those shallow mitigation measures receives higher public acceptability. Though still worth pursuing, they will not be effective enough to reach climate targets alone. Individual lifestyle changes toward less carbon-intensive ways of living are largely restricted to the consumption of goods and services, and without changes in material and ideational, shallow and deep factors, households cannot necessarily be expected to make (or even have) sustainable choices and contribute to sustainability on the macro level.

By contrast, reconfiguring the relevant deep structural factors in the interest of sustainable consumption would

challenge taken-for-granted pillars of the current political and economic system, societal institutions and technological and innovation infrastructures. It would put the spotlight on inequities and exploitative relations within societies, in particular between the Global North and the Global South, and turn the focus from the creation of profits to provisioning for needs satisfaction for all within planetary, but also societal (Brand et al., 2021), boundaries. Today's climate governance, as we know it, does not sufficiently consider such deep structural change, however, and therefore is likely to fail the targets of the Paris Agreement. A radical shift in perspective and action will be required for a successful transition toward sustainability.

Data availability statement

Datasets are available on request: The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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References

Abrahamse, W., and de Groot, J. (2013). "The psychology of behaviour change: an overview of theoretical and practical contributions," in *The Global Challenge of Encouraging Sustainable Living: Opportunities, Barriers, Policy and Practice*, eds. S. Fudge, M. Peters, S. M. Hoffman, and W. Wehrmeyer (Edward Elgar Publishing), 3–17. doi: 10.4337/9781781003756.00009

Anderson, K., Broderick, J. F., and Stoddard, I. (2020). A factor of two: how the mitigation plans of 'climate progressive' nations fall far short of Paris-compliant pathways. *Clim. Policy* 20, 1290–1304. doi: 10.1080/14693062.2020.1728209

Andersson, S., and Rahe, U. (2017). Accelerate innovation towards sustainable living: exploring the potential of living labs in a recently completed case. *J. Des. Res.* 15, 234–257. doi: 10.1504/JDR.2017.089914

Antal, M., and van den Bergh, J. C. J. M. (2014). Macroeconomics, financial crisis and the environment: strategies for a sustainability transition. *Environ. Innov. Soc. Transit.* 6, 47–66. doi: 10.1016/j.eist.2013.01.002

Arslan, A., Haapanen, L., Hurmelinna-Laukkanen, P., Tarba, S. Y., and Alon, I. (2021). Climate change, consumer lifestyles and legitimation strategies of sustainability-oriented firms. *Eur. Manag. J.* 39, 720–730. doi: 10.1016/j.emj.2021.03.005

Ayres, R. U., and Warr, B. (2009). *The Economic Growth Engine: How Energy and Work Drive Material Prosperity*. Cheltenham: Edward Elgar. doi: 10.4337/9781848445956

Bakker, S., Zuidgeest, M., De Coninck, H., and Huizenga, C. (2014). Transport, development and climate change mitigation: towards an integrated approach. *Transp. Rev.* 34, 335–355. doi: 10.1080/01441647.2014.903531

Balázs, B., Kelemen, E., Centofanti, T., Vasconcelos, M. W., and Iannetta, P. P. M. (2021). Integrated policy analysis to identify transformation paths to more sustainable legume-based food and feed value-chains in Europe. *Agroecol. Sustain. Food Syst.* 45, 931–953. doi: 10.1080/21683565.2021.1884165

Barad, K. (2003). Posthumanist performativity: toward an understanding of how matter comes to matter. *Signs J. Women Cult. Soc.* 28, 801–831. doi: 10.1086/345321

Beck, S., and Mahony, M. (2018). The politics of anticipation: the IPCC and the negative emissions technologies experience. *Glob. Sustain.* 1, E8. doi: 10.1017/sus.2018.7

Bennett, J. (2010). "Thing-power," in *Political Matter - Technoscience, Democracy, and Public Life*, eds B. Braun, and S. Whatmore (Minneapolis: University of Minnesota Press), 35–62.

Birch, K. (2016). Materiality and sustainability transitions: integrating climate change in transport infrastructure in Ontario, Canada. *Prometheus* 34, 191–206. doi: 10.1080/08109028.2017.1331612

Brand, K.-W. (2021). The black hole of unsustainability. A critical discussion of Ingolfur Blühdorn's approach. *Berl. J. Soziol.* 31, 279–307. doi: 10.1007/s11609-021-00438-6

Brand, U., Görg, C., and Wissen, M. (2020). Overcoming neoliberal globalisation: social-ecological transformation from a Polanyian perspective and beyond. *Globalizations* 17, 161–176. doi: 10.1080/14747731.2019.1644708

Brand, U., Muraca, B., Pineault, É., Sahakian, M., Schaffartzik, A., Novy, A., et al. (2021). From planetary to societal boundaries: an argument for collectively defined self-limitation. *Sustain. Sci. Pract. Policy* 17, 264–291. doi: 10.1080/15487733.2021.1940754

Brand, U., and Wissen, M. (2021). *The Imperial Mode of Living. Everyday Life and the Ecological Crisis of Capitalism*. London: Verso.

Broadbent, S., and Cara, F. (2018). Seeking control in a precarious environment: sustainable practices as an adaptive strategy to living under uncertainty. *Sustainability* 10, 51320. doi: 10.3390/su10051320

Büchs, M., and Koch, M. (2019). Challenges for the degrowth transition: the debate about wellbeing. *Futures* 105, 155–165. doi: 10.1016/j.futures.2018.09.002

Bui, S., Da Costa, I., De Schutter, O., Dedeurwaerdere, T., Hudon, M., and Feyereisen, M. (2019). Systemic ethics and inclusive governance: two key prerequisites for sustainability transitions of agri-food systems. *Agric. Human Values* 36, 277–288. doi: 10.1007/s10460-019-09917-2

Butler, J. (1990). *Gender Trouble*. Feminism and the Subversion of Identity. New York, NY: Routledge.

Callon, M. (1986). "The sociology of an actor-network: the case of the electric vehicle," in *Mapping the Dynamics of Science and Technology: Sociology of Science in the Real World*, eds M. Callon, J. Law, and A. Rip (London: Palgrave Macmillan UK), 19–34. doi: 10.1007/978-1-349-07408-2_2

Campos, I., Pontes, L. G., Marín-Gonzalez, E., Gährs, S., Hall, S., and Holstenkamp, L. (2020). Regulatory challenges and opportunities for collective renewable energy prosumers in the EU. *Energy Policy* 138, 111212. doi: 10.1016/j.enpol.2019.111212

Cavoli, C. (2021). Accelerating sustainable mobility and land-use transitions in rapidly growing cities: identifying common patterns and enabling factors. *J. Transp. Geogr.* 94, 103093. doi: 10.1016/j.jtrangeo.2021.103093

Chan, K. M. A., Boyd, D. R., Gould, R. K., Jetzkowitz, J., Liu, J.; Muraca, B. et al. (2020). Levers and leverage points for pathways to sustainability. *People Nat.* 2, 693–717. doi: 10.1002/pan3.10124

Chen, X., Despeisse, M., and Johansson, B. (2020). Environmental sustainability of digitalization in manufacturing: a review. *Sustainability* 12, 10298. doi: 10.3390/su122410298

Cox, E., Honegger, M., and Gadikota, G. (2020). Barriers to negative-emissions technologies. i*Earth* 3, 137–139. doi: 10.1016/j.oneear.2020.07.017

Creutzig, F., Niamir, L., Bai, X., Callaghan, M., Cullen, J., Díaz-José, J., et al. (2022). Demand-side solutions to climate change mitigation consistent with high levels of well-being. *Nat. Clim. Chang.* 12, 36–46. doi: 10.1038/s41558-021-01219-y

Cunha, F. B. F., Carani, C., Nucci, C. A., Castro, C., Silva, M. S., and Torres, E. A. (2021). Transitioning to a low carbon society through energy communities: lessons learned from Brazil and Italy. *Energy Res. Soc. Sci.* 75, 101994. doi: 10.1016/j.erss.2021.101994

Czirfusz, M., Pósfai, Z., Tóth, K.; Feldmár, N., and Kovács, V. (2019). *Annual Report on Housing Poverty in Hungary—Executive Summary. Habitat for Humanity, Hungary*. Available online at: https://habitat.hu/sites/lakhatasi-jelentes/wpcontent/uploads/sites/5/2020/01/HFH2019EN_V2.pdf (accessed June 20, 2020).

Daly, H. (2013). A further critique of growth economics. *Ecol. Econ.* 88, 20–24. doi: 10.1016/j.ecolecon.2013.01.007

De Rosa, M., Di Pasquale, J., and Adinolfi, F. (2021). The root towards more circularized animal production systems: from animal to territorial metabolism. *Animals* 11, 1540. doi: 10.3390/ani11061540

Di Giulio, A., and Fuchs, D. (2014). Sustainable consumption corridors: concept, objections, and responses. *GAIA* 23, 184–192. doi: 10.14512/gaia.23.S1.6

Dorninger, C., Hornborg, A., Abson, D. J., von Wehrden, H., Schaffartzik, A., Giljum, S., et al. (2021). Global patterns of ecologically unequal exchange: implications for sustainability in the 21st century. *Ecol. Econ.* 179, 106824. doi: 10.1016/j.ecolecon.2020.106824

Druckman, A., and Gatersleben, B. (2019). A time-use approach: high subjective wellbeing, low carbon leisure. *J. Public Ment. Health* 18, 85–93. doi: 10.1108/JPMH-04-2018-0024

Echeverri, L. G. (2018). Investing for rapid decarbonization in cities. *Curr. Opin. Environ. Sustain.* 30, 42–51. doi: 10.1016/j.cosust.2018.02.010

Ehgartner, U., and Hirth, S. (2019). The right to repair and endangered practices. *Discover Society* 75. Available online at: https://archive.discoversociety.org/2019/12/04/the-right-to-repair-and-endangered-practices (accessed February 27, 2023).

Eker, S., Garcia, D., Valin, H., and van Ruijven, B. (2021). Using social media audience data to analyse the drivers of low-carbon diets. *Environ. Res. Lett.* 16, 074001. doi: 10.1088/1748-9326/abf770

Ertekin, Z. O., and Atik, D. (2015). Sustainable markets: motivating factors, barriers, and remedies for mobilization of slow fashion. *J. Macromarketing* 35, 53–69. doi: 10.1177/0276146714535932

Fletcher, J., Longnecker, N., and Higham, J. (2019). Envisioning future travel: moving from high to low carbon systems. *Futures* 109, 63–72. doi: 10.1016/j.futures.2019.04.004

Foucault, M. (1980). *Power/Knowledge: Selected Interviews and Other Writings, 1972-1977*. New York, NY: Pantheon Books.

Foucault, M. (2008). *The Birth of Biopolitics: Lectures at the Collège de France, 1978-1979*. New York, NY: Palgrave Macmillan.

Fuchs, D., and Lorek, S. (2005). Sustainable consumption governance. A history of promises and failures. *J. Consum. Policy* 28, 261–288. doi: 10.1007/s10603-005-8490-z

Fuchs, D., Lorek, S., Di Giulio, A., and Defila, R. (2019). "Sources of power for sustainable consumption: where to look," in *Power and Politics in Sustainable Consumption Research and Practice,* eds M. Martiskainen, L. Middlemiss, and C. Isenhour (New York, NY: Routledge), 62–83. doi: 10.4324/9781315165509-3

Fuchs, D., Sahakian, M., Gumbert, T., Di Giulio, A., Maniates, M., Lorek, S., et al. (2021a). *Consumption Corridors : Living a Good Life within Sustainable Limits*. New York, NY: Routledge doi: 10.4324/9780367748746

Fuchs, D., Steinberger, J., Pirgmaier, E., Lamb, W., Brand-Correa, L., Mattioli, G., et al. (2021b). A corridors and power-oriented perspective on energy-service demand and needs satisfaction. *Sustain Sci. Pract. Policy* 17, 163–173. doi: 10.1080/15487733.2021.1912907

Geels, F. (2002). Technological transitions as evolutionary reconfiguration processes: a multi-level perspective and a case-study. *Res. Policy* 31, 1257–1274. doi: 10.1016/S0048-7333(02)00062-8

Geels, F., and Schot, J. (2007). Typology of sociotechnical transition pathways. *Res. Policy* 36, 399–417. doi: 10.1016/j.respol.2007.01.003

Giddens, A. (1983). Comments on the theory of structuration. *J. Theory Soc. Behav.* 13, 75–80. doi: 10.1111/j.1468-5914.1983.tb00463.x

Giddens, A. (1984). *The Constitution of Society: Outline of the Theory of Structuration*. Cambridge: Polity Press.

Gossen, M., Holzhauer, B., and Müller, R. (2020). Konsum junger menschen: zwischen nachhaltigkeit und materialistischen wünschen. *Ökologisches Wirtschaften* 33, 18–21. doi: 10.14512/OEW350218

Gossen, M., Ziesemer, F., and Schrader, U. (2019). Why and how commercial marketing should promote sufficient consumption: a systematic literature review. *J. Macromarketing* 39, 252–269. doi: 10.1177/0276146719866238

Gough, I. (2017). *Heat, Greed and Human Need: Climate Change, Capitalism and Sustainable Wellbeing*. Cheltenham: Edward Elgar. doi: 10.4337/9781785365119

Greenhalgh, T., and Stones, R. (2010). Theorising big IT programmes in healthcare: strong structuration theory meets actor-network theory. *Soc. Sci. Med.* 70, 1285–1294. doi: 10.1016/j.socscimed.2009.12.034

Grenni, S., Soini, K., and Horlings, L. G. (2019). The inner dimension of sustainability transformation: how sense of place and values can support sustainable place-shaping. *Sustain. Sci.* 15, 411–422. doi: 10.1007/s11625-019-00743-3

Grosjean, G., Fuss, S., Koch, N., Bodirsky, B. L., De Cara, S., and Acworth, W. (2016). Options to overcome the barriers to pricing European agricultural emissions. *Clim. Policy* 18, 151–169. doi: 10.1080/14693062.2016.1258630

Gunderson, R., Stuart, D., and Petersen, B. (2018). Ideological obstacles to effective climate policy: the greening of markets, technology, and growth. *Cap. Cl.* 42, 133–160. doi: 10.1177/0309816817692127

Guy, J.-S. (2022). Social structures, social change and the metric/nonmetric distinction. *Can. J. Adm. Sci.* 1–11. doi: 10.1002/cjas.1688

Hards, S. K. (2013). Status, stigma and energy practices in the home. *Local Environ.* 18, 438–454. doi: 10.1080/13549839.2012.748731

Hart, C. (1998). *Doing a Literature Review: Releasing the Social Science Research Imagination*. London: Sage Publications.

Harvey, D. (1982). *The Limits to Capital*. Oxford: Basil Blackwell.

Hayward, C., and Lukes, S. (2008). Nobody to shoot? Power, structure, and agency: a dialogue. *J. Power* 1, 5–20. doi: 10.1080/17540290801943364

Henders, S., Ostwald, M., Verendel, V., and Ibisch, P. (2018). Do national strategies under the UN biodiversity and climate conventions address agricultural commodity consumption as deforestation driver? *Land Use Policy* 70, 580–590. doi: 10.1016/j.landusepol.2017.10.043

Hicks, C., and Kuhndt, M. (2013). "Emergent futures? Signposts to sustainable living in Europe and pathways to scale," in *The Global Challenge of Encouraging Sustainable Living: Opportunities, Barriers, Policy and Practice*, eds S. Fudge, M. Peters, S. M. Hoffmann, and W. Wehrmeyer (Cheltenham, Northampton: Elgar Publishing), 85–105. doi: 10.4337/9781781003756.00014

Hirth, S., Bürstmayr, T., and Strüver, A. (2022). Discourses of sustainability and imperial modes of food provision: agri-food-businesses and consumers in Germany. *Agric. Hum. Values.* 39, 573–588. doi: 10.1007/s10460-021-10269-z

Hoffmann, M., and Spash, C. L. (2021). *The Impacts of Climate Change Mitigation on Work for the Austrian Economy*. SRE - Discussion Papers, 10/2021, Institute for Multilevel Governance and Development, Department of Socioeconomics, Vienna University of Economics and Business, Vienna.

IGES, Aalto-University, D-mat, SITRA, and KR Foundation (2019). *1.5-Degree Lifestyles. Targets and Options for Reducing Lifestyle Carbon Footprints*. Hayama: IGES.

Ilieva, I., and Bremdal, B. (2020). "Implementing local flexibility markets and the uptake of electric vehicles - the case for Norway," in *2020 6th IEEE International Energy Conference (ENERGYCon)* (Gammarth), 1047–1052. doi: 10.1109/ENERGYCon48941.2020.9236611

IPBES (2016). "The assessment report of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services on pollinators, pollination and food production," in *Secretariat of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services*, eds S. G. Potts, V. L. Imperatriz-Fonseca, and H. T. Ngo (Bonn: IPBES).

IPCC (2022). "Climate change 2022: mitigation of climate change," in *Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge; New York, NY: Cambridge University Press).

Jackson, T., and Smith, C. (2018). "Towards sustainable lifestyles: understanding the policy challenge," in *The Cambridge Handbook of Psychology and Economic Behaviour,* 2nd ed., ed A. Lewis (Cambridge: Cambridge University Press), 481–515. doi: 10.1017/9781316676349.017

Jacobson, L., Åkerman, J., Giusti, M., and Bhowmik, A. K. (2020). Tipping to staying on the ground: internalized knowledge of climate change crucial for transformed air travel behaviour. *Sustainability* 12, 51994. doi: 10.3390/su12051994

Jensen, C. L., and Friis, F. (2019). *Experimenting with Resource-intensive Practices and Related Energy Consumption Levels*. Eceee Summer Study Proceedings 2019-June. Available online at: https://vbn.aau.dk/en/publications/experimenting-with-resource-intensive-practices-and-related-energ (accessed February 27, 2023).

Jensen, J. S., Cashmore, M., and Elle, M. (2017). Reinventing the bicycle: how calculative practices shape urban environmental governance. *Env. Polit.* 26, 459–479. doi: 10.1080/09644016.2017.1311089

Kanda, W., and Kivimaa, P. (2020). What opportunities could the COVID-19 outbreak offer for sustainability transitions research on electricity and mobility? *Energy Res. Soc. Sci.* 68, 101666. doi: 10.1016/j.erss.2020.101666

Keen, S., Ayres, R. U., and Standish, R. (2019). A note on the role of energy in production. *Ecol. Econ.* 157, 40–46. doi: 10.1016/j.ecolecon.2018.11.002

Keil, K., and Kreinin, H. (2022). Slowing the treadmill for a good life for All? German trade union narratives and social-ecological transformation. *J. Ind. Rel.* 64, 564–584. doi: 10.1177/00221856221087413

Kirchherr, J., Piscicelli, L., Bour, R., Kostense-Smit, E., Muller, J., Huibrechtse-Truijens, A., et al. (2018). Barriers to the circular economy: evidence from the European union (EU). *Ecol. Econ.* 150, 264–272. doi: 10.1016/j.ecolecon.2018.04.028

Koretskaya, O., and Feola, G. (2020). A framework for recognizing diversity beyond capitalism in agri-food systems. *J. Rural Stud.* 80, 302–313. doi: 10.1016/j.jrurstud.2020.10.002

Kreinin, H., and Aigner, E. (2022). From "Decent work and economic growth" to "Sustainable work and economic degrowth": a new framework for SDG 8. *Empirica* 49, 281–311. doi: 10.1007/s10663-021-09526-5

Kuokkanen, A., Mikkila, M., Kuisma, M., Kahiluoto, H., and Linnanen, L. (2016). The need for policy to address the food system lock-in: a case study of the Finnish context. *J. Clean. Prod.* 140, 933–944. doi: 10.1016/j.jclepro.2016.06.171

Lamb, W. F., Mattioli, G., Levi, S., Roberts, J. T., Capstick, S., Creutzig, F., et al. (2020). Discourses of climate delay. *Glob. Sustain.* 3, e17. doi: 10.1017/sus.2020.13

Larsen, K., Gunnarsson-Östling, U., and Westholm, E. (2011). Environmental scenarios and local-global level of community engagement: environmental justice, jams, institutions and innovation. *Futures* 43, 413–423. doi: 10.1016/j.futures.2011.01.007

Latour, B. (2005). *Reassembling the Social - An Introduction to Actor-Network-Theory*. Oxford: Oxford University Press.

Lessenich, S. (2019). *Living Well at Others' Expense: The Hidden Costs of Western Prosperity*. Cambridge: Polity Press.

Lettenmeier, M. (2018). *A Sustainable Level of Material Footprint: Benchmark for Designing Ecologically Sustainable Lifestyles* [Doctoral Dissertation]. Aalto University, Helsinki.

Longo, Y., Coyne, I., and Joseph, S. (2017). The scales of general well-being (SGWB), *Pers. Individ. Differ.* 109, 148–159. doi: 10.1016/j.paid.2017.01.005

Loorbach, D., Avelino, F., Haxeltine, A., Wittmayer, J. M., O'Riordan, T., Weaver, P., et al. (2016). The economic crisis as a game changer? Exploring the role of social construction in sustainability transitions. *Ecol. Soc.* 21, 15. doi: 10.5751/ES-08761-210415

Malm, A. (2013). The origins of fossil capital: from water to steam in the british cotton industry*. *Hist. Mater.* 21, 15–68. doi: 10.1163/1569206X-12341279

Manca, S., and Fornara, F. (2019). Attitude toward sustainable transport as a function of source and argument reliability and anticipated emotions. *Sustainability* 11, 23288. doi: 10.3390/su11123288

Maniates, M. (2020). "Beyond magical thinking," in *Routledge Handbook of Global Sustainability Governance*, eds A. Kalfagianni, D. Fuchs, and A. Hayden (London: Routledge), 267–281. doi: 10.4324/9781315170237-22

Maniates, M. F. (2001). Individualization: plant a tree, buy a bike, save the world? *Glob. Environ. Polit.* 1, 31–52. doi: 10.1162/152638001316881395

Manzini, E. (2013). "Collaborative (and sustainable) behaviours: grassroots innovation, social change and enabling strategies," in *The Global Challenge of Encouraging Sustainable Living: Opportunities, Barriers, Policy and Practice*, eds S. Fudge, M. Peters, S. M. Hoffmann, and W. Wehrmeyer (Cheltenham, Northampton: Elgar Publishing), 131–142. doi: 10.4337/9781781003756.00016

Martek, I., Hosseini, M. R., Shrestha, A., Zavadskas, E. K., and Seaton, S. (2018). The sustainability narrative in contemporary architecture: falling short of building a sustainable future. *Sustainability* 10, 40981. doi: 10.3390/su10040981

Mathy, S., Menanteau, P., and Criqui, P. (2018). After the Paris agreement: measuring the global decarbonization wedges from national energy scenarios. *Ecol. Econ.* 150, 273–289. doi: 10.1016/j.ecolecon.2018.04.012

Meadows, D. H., Meadows, D. L., Randers, J., and Behrens III, W. W. (1972). *The Limits to Growth. A Report for the Club of Rome's Project on the Predicament of Mankind*. New York, NY. doi: 10.1349/ddlp.1

Mercure, J.-F., Pollitt, H., Bassi, A. M., Viñuales, J. E., and Edwards, N. R. (2016). Modelling complex systems of heterogeneous agents to better design sustainability transitions policy. *Glob. Environ. Change* 37, 102–115. doi: 10.1016/j.gloenvcha.2016.02.003

Messner, D. (2015). A social contract for low carbon and sustainable development. Reflections on non-linear dynamics of social realignments and technological innovations in transformation processes. *Technol. Forecast. Soc. Change* 98, 260–270. doi: 10.1016/j.techfore.2015.05.013

Mock, M., Omann, I., Polzin, C., Spekkink, W., Schuler, J., Pandur, V., et al. (2019). "Something inside me has been set in motion": exploring the psychological wellbeing of people engaged in sustainability initiatives. *Ecol. Econ.* 160, 1–11. doi: 10.1016/j.ecolecon.2019.02.002

Mont, O., Neuvonen, A., and Lahteenoja, S. (2014). Sustainable lifestyles 2050: stakeholder visions, emerging practices and future research. *J. Clean. Prod.* 63, 24–32. doi: 10.1016/j.jclepro.2013.09.007

Morrow, K. (2021). Tackling climate change and gender justice - integral; not optional. *ONATI Socio-Leg. Ser.* 11, 207–230. doi: 10.35295/OSLS.IISL/0000-0000-0000-1166

Mosannenzadeh, F., Di Nucci, M. R., and Vettorato, D. (2017). Identifying and prioritizing barriers to implementation of smart energy city projects in Europe: an empirical approach. *Energy Policy* 105, 191–201. doi: 10.1016/j.enpol.2017.02.007

Newell, P., and Simms, A. (2021). How did we do that? Histories and political economies of rapid and just transitions. *New Polit. Econom.* 26, 907–922. doi: 10.1080/13563467.2020.1810216

Newell, P., Twena, M., and Daley, F. (2021). Scaling behaviour change for a 1.5-degree world: challenges and opportunities. *Glob. Sustain.* 4. doi: 10.1017/sus.2021.23

Otto, I. M., Donges, J. F., Cremades, R., Bhowmik, A., Hewitt, R. J., Lucht, W., et al. (2020). Social tipping dynamics for stabilizing Earth's climate by 2050. *Proc. Natl. Acad. Sci. USA.* 117, 2354–2365. doi: 10.1073/pnas.1900577117

Palea, V. (2021). Accounting for sustainable finance: does fair value measurement fit for longterm equity investments? *Meditari Account. Res.* 30, 22–38. doi: 10.1108/MEDAR-07-2020-0965

Pargman, D., Biørn-Hansen, A., Eriksson, E., Laaksolahti, J., and Robèrt, M. (2020). "From Moore's Law to the carbon law," in *ACM International Conference Proceeding Series. ICT4S2020: Proceedings of the 7th International Conference on ICT for Sustainability*, 285–293. doi: 10.1145/3401335.3401825

Pastukhova, M., and Westphal, K. (2020). Governing the global energy transformation. *Lect. Notes Energy* 73, 341–364. doi: 10.1007/978-3-030-39066-2_15

Perkins, K. M., Munguia, N., Moure-Eraso, R., Delakowitz, B., Giannetti, B. F., Liu, G., et al. (2018). International perspectives on the pedagogy of climate change. *J. Clean. Prod.* 200, 1043–1052. doi: 10.1016/j.jclepro.2018.07.296

Pichler, M., Krenmayr, N., Schneider, E., and Brand, U. (2021). EU industrial policy: between modernization and transformation of the automotive industry. *Environ. Innov. Soc. Transit.* 38, 140–152. doi: 10.1016/j.eist.2020.12.002

Pirgmaier, E., and Steinberger, J. K. (2019). Roots, riots, and radical change-A road less travelled for ecological economics. *Sustainability* 11, 72001. doi: 10.3390/su11072001

Potrc, S., Cucek, L., Martin, M., and Kravanja, Z. (2021). Sustainable renewable energy supply networks optimization-The gradual transition to a renewable energy system within the European Union by 2050. *Renew. Sustain. Energy Rev.* 146, 111186. doi: 10.1016/j.rser.2021.111186

Powell, C. (2013). "Radical relationism: a proposal," in *Conceptualizing Relational Sociology - Ontological and Theoretical Issues*, eds C. Powell, and F. Dépelteau (New York, NY: Palgrave Macmillan), 187–208.

Prinz, L., and Pegels, A. (2018). The role of labour power in sustainability transitions: insights from comparative political economy on Germany's electricity transition. *Energy Res. Soc. Sci.* 41, 210–219. doi: 10.1016/j.erss.2018.04.010

Raven, R., Reynolds, D., Lane, R., Lindsay, J., Kronsell, A., and Arunachalam, D. (2021). Households in sustainability transitions: a systematic review and new research avenues. *Environ. Innov. Soc. Transit.* 40, 87–107. doi: 10.1016/j.eist.2021.06.005

Reckwitz, A. (2002). Toward a theory of social practices: a development in culturalist theorizing. *Eur. J. Soc. Theory* 5, 243–263. doi: 10.1177/13684310222225432

Riechers, M., Patru-Duse, I. A., and Balazsi, A. (2021). Leverage points to foster human-nature connectedness in cultural landscapes. *Ambio* 50, 1670–1680. doi: 10.1007/s13280-021-01504-2

Rip, A., and Kemp, R. (1998). "Technological change," in *Human Choice and Climate Change, Vol. 2*, eds S. Rayner and E. L., Malone (Columbus, OH: Battelle Press), 327–399.

Roberts, C., Geels, F. W., Lockwood, M., Newell, P., Schmitz, H., Turnheim, B., et al. (2018). The politics of accelerating low-carbon transitions: towards a new research agenda. *Energy Res. Soc. Sci.* 44, 304–311. doi: 10.1016/j.erss.2018.06.001

Rootzén, J., Karlsson, I., Johnsson, F., Kadefors, A., and Uppenberg, S. (2020). Supply-chain collective action towards zero CO2 emissions in infrastructure construction: mapping barriers and opportunities. *IOP Conf. Ser.: Earth Environ. Sci.* 588, 042064. doi: 10.1088/1755-1315/588/4/042064

Rossi, A., Bui, S., and Marsden, T. (2019). Redefining power relations in agrifood systems. *J. Rural Stud.* 68, 147–158. doi: 10.1016/j.jrurstud.2019.01.002

Ruhrort, L. (2020). Reassessing the role of shared mobility services in a transport transition: can they contribute the rise of an alternative socio-technical regime of mobility? *Sustainability* 12, 8253. doi: 10.3390/su12198253

Ruhrort, L., and Allert, V. (2021). Conceptualizing the role of individual agency in mobility transitions: avenues for the integration of sociological and psychological perspectives. *Front. Psychol.* 12, 623652. doi: 10.3389/fpsyg.2021.623652

Saari, U. A., Herstatt, C., Tiwari, R., Dedehayir, O., and Mäkinen, S. J. (2021). The vegan trend and the microfoundations of institutional change: a commentary on food producers' sustainable innovation journeys in Europe. *Trends Food Sci. Technol.* 107, 161–167. doi: 10.1016/j.tifs.2020.10.003

Sahakian, M. (2019). 'More, bigger, better' household appliances: contesting normativity in practices through emotions. *J. Consum. Cult.* 22, 21–39. doi: 10.1177/1469540519889983

Sareen, S., and Grandin, J. (2020). European green capitals: branding, spatial dislocation or catalysts for change? *Geogr. Ann. Ser. B. Huma. Geogr.* 102, 101–117. doi: 10.1080/04353684.2019.1667258

Schaffartzik, A., and Fischer-Kowalski, M. (2018). Latecomers to the fossil energy transition, frontrunners for change? the relevance of the energy 'underdogs' for sustainability transformations. *Sustainability* 10, 82650. doi: 10.3390/su10082650

Schaffartzik, A., Pichler, M., Pineault, E., Wiedenhofer, D., Gross, R., and Haberl, H. (2021). The transformation of provisioning systems from an integrated perspective of social metabolism and political economy: a conceptual framework. *Sustain. Sci.* 16, 1405–1421. doi: 10.1007/s11625-021-00952-9

Scherrer, C. (2011). Reproducing hegemony: US finance capital and the 2008 crisis. *Crit. Policy Stud.* 5, 219–246. doi: 10.1080/19460171.2011.606297

Schmidt, R., Lyytinen, K. M., Keil, M., and Cule, P. (2001). Identifying software project risks: an international delphi study. *J. Manag. Inf. Syst.* 17, 5–36. doi: 10.1080/07421222.2001.11045662

Schnaiberg, A. (1980). *The Environment, from Surplus to Scarcity*. New York: Oxford University Press.

Schor, J. B. (1991). *The Overworked American: The Unexpected Decline of Leisure*. New York, NY: Basic Books.

Schulz, C., Hjaltadóttir, R. E., and Hild, P. (2019). Practising circles: studying institutional change and circular economy practices. *J. Clean. Prod.* 237, 117749. doi: 10.1016/j.jclepro.2019.117749

Seo, M.-G., and Creed, W. E. D. (2002). Institutional contradictions, praxis, and institutional change: a dialectical perspective. *Acad. Manag. Rev.* 27, 222–247. doi: 10.2307/4134353

Shirani, F., Butler, C., Henwood, K., Parkhill, K., and Pidgeon, N. (2015). 'I'm not a tree hugger, I'm just like you': changing perceptions of sustainable lifestyles. *Env. Polit.* 24, 57–74. doi: 10.1080/09644016.2014.959247

Somerville, P. (2020). A critique of climate change mitigation policy. *Policy Polit.* 48, 355–378. doi: 10.1332/030557319X15661682426163

Sovacool, B. K., Bazilian, M., Griffiths, S., Kim, J., Foley, A., and Rooney, D. (2021). Decarbonizing the food and beverages industry: a critical and systematic review of developments, sociotechnical systems and policy options. *Renew. Sustain. Energy Rev.* 143, 110856. doi: 10.1016/j.rser.2021.110856

Spangenberg, J. H. (2013). Pick simply the best: sustainable development is about radical analysis and selective synthesis, not about old wine in new bottles. *Sustain. Dev.* 21, 101–111. doi: 10.1002/sd.1561

Spash, C. L. (2014). Policy analysis: empiricism, social construction and realism. *Österr. Z. Polit.* 43, 401–410. doi: 10.15203/ozp.291.vol43iss4

Spash, C. L. (2016). This changes nothing: the paris agreement to ignore reality. *Globalizations* 13, 928–933. doi: 10.1080/14747731.2016.1161119

Stankuniene, G. (2021). Energy saving in households: a systematic literature review. *Eu. J. Interdiscip. Stud.* 13, 45–57. Available online at: https://ideas.repec.org/a/jis/ejistu/y2021i01id467.html

Støa, E., and Aune, M. (2012). "Sustainable housing cultures," in *International Encyclopedia of Housing and Home*, ed S. J. Smith (Amsterdam: Elsevier Science), 111–116. doi: 10.1016/B978-0-08-047163-1.00556-7

Stoddard, I., Anderson, K., Capstick, S., Carton, W., Depledge, J., Facer, K., et al. (2021). Three decades of climate mitigation: why haven't we bent the global emissions curve? *Annu. Rev. Environ. Resour.* 46, 653–689. doi: 10.1146/annurev-environ-012220-011104

Stones, R. (2005). *Structuration Theory*. New York, NY: Palgrave Macmillan. doi: 10.1007/978-0-230-21364-7

Streck, C. (2020). Filling in for governments? The role of the private actors in the international climate regime. *J. Eur. Environ. Plan. Law* 17, 5–28. doi: 10.1163/18760104-01701003

Tröger, J., and Reese, G. (2021). Talkin' bout a revolution: an expert interview study exploring barriers and keys to engender change towards societal sufficiency orientation. *Sustain. Sci.* 16, 827–840. doi: 10.1007/s11625-020-00871-1

Tziva, M., Negro, S. O., Kalfagianni, A., and Hekkert, M. P. (2020). Understanding the protein transition: the rise of plant-based meat substitutes. *Environ. Innov. Soc. Transit.* 35, 217–231. doi: 10.1016/j.eist.2019.09.004

Vita, G., Ivanova, D., Dumitru, A., Garcia-Mira, R., Carrus, G., Stadler, K., et al. (2020). Happier with less? Members of European environmental grassroots initiatives reconcile lower carbon footprints with higher life satisfaction and income increases. *Energy Res. Soc. Sci.* 60, 101329. doi: 10.1016/j.erss.2019.101329

Wainwright, J., and Mann, G. (2013). Climate leviathan. *Antipode.* 45, 1–22. doi: 10.1111/j.1467-8330.2012.01018.x

Wamsler, C., and Raggers, S. (2018). Principles for supporting city-citizen commoning for climate adaptation: from adaptation governance to sustainable transformation. *Environ. Sci. Policy* 85, 81–89. doi: 10.1016/j.envsci.2018.03.021

Warde, A. (2005). Consumption and theories of practice. *J. Consum. Cult.* 5, 131–153. doi: 10.1177/1469540505053090

Wilcox, H. A. (1975). *Hothouse Earth.* Washington, DC: US Dept. of Defense, Navy's Ocean.

Xiao, Y., and Watson, M. (2019). Guidance on conducting a systematic literature review. *J. Plan. Educ. Res.* 39, 93–112. doi: 10.1177/0739456X17723971

Zurek, M., Hebinck, A., Leip, A., Vervoort, J., Kuiper, M., Garrone, M., et al. (2018). Assessing sustainable food and nutrition security of the EU food system-an integrated approach. *Sustainability* 10, 14271. doi: 10.3390/su10114271

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Sustainable consumption and the Global South: A conceptual exposition

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Although deliberations around the idea of sustainable consumption have triggered pro-environmental consumption behaviors, empirical works show such consumption choices hardly manage to lower the overall environmental impacts of their total consumption baskets. Driven by corporate-led globalization, most developing countries have adopted the prevailing neoliberal economic model centered on growthism and developmentalism. What complicates the situation further is that this capitalistic economic model fetishizes the wealthy and valorizes aspirations that shape socio-culturally held notions of good life toward overconsumption, especially in the Global South. The discussion on sustainable consumption needs to expand its scope from the post-materialistic discourses in the Global North to realign itself better with the developmental discourse in the GS. Expanding this scope is easier said than done because of the fundamental dependency of the neo-liberal economic policy-driven developmentalism on consumerism. Once these macro-economic priorities percolate into socio-cultural priorities, further driving individuals' sense of the good life, it becomes even more challenging to decouple materialistically-oriented need-satisfiers from wellbeing. Therefore, it is to theorize how the act of consumption happens at the complex intersections of political-economic priorities, socio-cultural conventions, and individual aspirations for a better life, which is even more so relevant in the context of the GS. It is critical to understand, especially for the Global South, how these structural factors percolate into socio-cultural and individual priorities through the changing notions of the good life and eventually act as the fundamental sustaining factors that keep the prevailing political-economic arrangements running.

KEYWORDS

Global South, good life, sustainable consumption, alternative economy, conceptual framework

Sustainable consumption: History, scope, and gaps

It has become evident that unless we take the issue of opulence head-on, the looming climate crisis threatening humanity's very existence cannot be addressed at its core (Brand and Markus, 2017; Garcia et al., 2021; Newell et al., 2021; Sahakian et al., 2021). The literature on sustainable consumption has grown significantly in the last few decades to shape consumer behaviors toward more sustainable forms. Deliberations around the idea of sustainable consumption have triggered pro-environmental consumption behaviors, at least among the well-to-do sections of the Global North (henceforth GN). Empirical works, however, show that such consumption choices hardly manage to lower the overall environmental impacts of their total consumption baskets (Kastner and Matthies, 2014; Moser and Kleinhückelkotten, 2018).

One of the default explanations put forth to expound on the impasse faced by consumer policies in the GN is

> The quest for sustainability has run up against the unwillingness of privileged consumers to relinquish the lifestyles to which they have become accustomed. Accordingly, this inertia not only signals a moral lapse into hedonism, but reflects the degree to which the maintenance of personal identity has become linked to consumption (Soron, 2010, p. 173).

This impasse is partly owing to the "in-built limits of the prevailing rational choice model within the sphere of consumer policy" (Jackson, 2006, p. 110). Moreover, the "attitude-behavior" gap or the "value-action" gap is already a well-documented pattern observed in the case of individuals molding their consumption choices as per any socio-environmental concerns (Carrington et al., 2010; Young et al., 2010; Greenindex, 2012; Terlau and Hirsch, 2015). This literature also focused on the agency factors that drive consumption, including values, attitudes, knowledge, and intentions (Hurth, 2010). The underlying model of consumers in the sustainable consumption literature is simplified and ignores how everyday consumption practices are embedded within a nexus of values, non-instrumental motivations, emotions, self-conception, and cultural associations (Soron, 2010). Owing to this, studies on sustainable consumption fail to pay due importance to the identity-oriented, expressive, and aesthetic dimensions of prevailing consumption patterns situated at the intersection of individuals and society (Dobers and Strannegard, 2005; Soron, 2010). This simplified model of consumers is why sustainable consumption practices are not adopted in society (Soron, 2010). Another point to note is that pro-environmental consumption behaviors and values are developed as an extension of post-materialistic values, feasible and researched mainly in societies of the GN that have reached a certain threshold of material saturation in terms of standards of living (Inglehart, 2008; Zhou, 2010; Hurst et al., 2013).

Relatively less attention has been paid in this literature to the Global South (henceforth GS). However, in rapidly developing countries like India, there is an emerging upper class with consumption levels comparable to the global middle or upper-middle class (Bhar, 2021). At the same time, a significant section of the world population does not manage to lead any form of decent living, whereas another tiny section is living lifestyles that are clearly beyond any sustainability limits (Gore, 2015, 2020; Hardoon, 2015). The GS, where about 85% of the world's population resides, is currently experiencing three phenomena simultaneously: (1) a sharp rise in income as well as consumption inequality (comparable to that of the Gilded Age[1]), (2) doing poorly in addressing or responding to the pressing environmental sustainability and justice concerns, and (3) rise in environmentally-impactful luxury consumption patterns as well as the emergence of consumerism as a predominant outlook toward life (Chancel and Piketty, 2019; Bhar, 2021; Bhar et al., 2022). Driven by corporate-led globalization, most developing countries have adopted the prevailing neoliberal economic model, be it seemingly democratic or authoritarian, centered on growthism and developmentalism (Fuchs, 2007; Siddiqui, 2012). What complicates the situation further is that this capitalistic economic model fetishizes the wealthy and valorizes aspirations that shape socio-culturally held notions of good life toward overconsumption, in the GS at least as strong as in the GN (Bhar, 2021). The way the dominant idea of development in the GS has oriented through consumeristic pathways to higher individual freedom of consumer choice and material conveniences makes it more so important to understand the ramification of this in the GS. The very fact that this dominant economic model intrinsically depends on consumers' insatiable desires as its most significant driver makes it inevitable to look for alternative economic models. In other words, conceptualizing alternative models becomes crucial as sustainable consumption cannot be achieved without bringing fundamental systemic change away from the prevailing neoliberal model that thrives on consumerism (Kallis et al., 2020).

Scholars show that the core problem of this age of consumerism is that we seem to have adopted material means like expensive cars, phones, and personal accessories to satisfy some of our fundamental needs and wants, such as security, companionship, and others (Jackson et al., 2004; Jackson, 2005). Decoupling those needs and wants from the prevailing materialistic need-satisfiers seems to be the only way toward a sustainable world (Jackson, 2005; Middlemiss, 2018). In that same vein, adopting more community-oriented and local economy-dependent ways of life is promoted, where a community-supported life can be the need-satisfier to human needs such as companionship (Ibid.).

In this sense, the sustainable consumption discourse needs to expand its scope from the post-materialistic perspective in the GN and realign itself better with the developmental discourse in the GS (Booth, 2020, 2021; Matthew, 2021). Spengler (2016), through defining sufficiency as a minimum and maximum, does indicate the need for this realignment of the sustainable consumption discourse in the GS. Expanding this scope of the discourse, however, is easier said than done because of the fundamental dependency of the neo-liberal economic policy-driven developmentalism on consumerism both in GN and GS. Another challenge is that once these macro-economic priorities percolate into socio-cultural priorities, further mainstreaming individuals' sense of the good life, it becomes even more challenging to decouple materialistically-oriented need-satisfiers from wellbeing. This decoupling, however, seems to be the only way forward for a sustainable and just future for all that offers a higher sense of wellbeing. The need is to develop a robust, theoretically grounded conceptual framework to guide necessary empirical research. In the following, I will present some leading questions and conceptual schemas, which will chart out possible trajectories for developing such a framework.

Reviewing conceptual gaps in the sustainable consumption literature

Argues that the literature on sustainable consumption needs some novel insights to go beyond what denote as a technocratic

1 Crabtree (2018) denotes the current economic condition in the country as "India's New Gilded Age" where the level of stark inequalities can be equated with that observed in the late nineteenth century in the US.

"lever, knobs, and dials" approach for inducing or nudging changes in consumption behavior. Evans (2019) shows how even though different phases in the literature on sustainable consumption have emerged to fill various theoretical gaps, comprehensive conceptual frameworks still do not exist that link the macroeconomic factors with the everyday symbolic aspect of consumption. Warde (2010) and Warde (2014) suggests that acquisition, appropriation, and appreciation are either "the three fundamental dimensions of consumption" or the thematic preoccupations of successive waves of consumption scholarship. The literature on sustainable consumption developed substantially with the cultural turn within the sociology of consumption and with that, the focus of this literature moved from the acquisition to the appreciation dimension (Evans, 2019). In this turn, the focus came on the meaning creation aspects of consumption primarily through the lens of postmodernism (Evans, 2019). Consumption choices were seen as signifying "webs of cultural meanings which constitute symbolic resources for individual choice" (Warde, 2014, p. 281). The focus was also on examining consumption through the lens of individual choices. In the process, scholarly attention shifted from the acquisition and appropriation dimensions of consumption to the appreciation dimension (Evans, 2019). However, the most significant caveat was that the link between production and consumption was lost, with the acquisition dimension losing priority.

An overemphasis on individual consumer choice being stripped away from its situatedness at the intersection of socio-cultural and political-economic realms meant that the study of consumption was losing its fundamentally normative aspect of linking consumption to socio-environmental externalities (Evans, 2019). Social practice theory emerged at this juncture, focused on inconspicuous aspects of consumption, and did manage to dissolve the overemphasis on individual autonomy or will to power (Shove et al., 2012; Evans, 2019). And instead, the focus is brought on the habitual aspects of consumption. Various studies focusing on inconspicuous consumption patterns developed on this theory, and the point of analysis shifted from appropriation and appreciation aspects of consumption back to acquisition (Evans, 2019, 2020). This meant that the previous thrust on consumer culture and the connection with the larger economic forces were entirely lost. So, the need is to situate the act of consumption within the larger economic priorities and the consumer culture. Soron (2010), drawing from Wilk (2002) and Jackson et al. (2004), argues that a more fruitful line of inquiry would be to incorporate socially embedded approaches to sustainable consumption by recognizing the intricate relationship between individual agency and the social and cultural contexts in which individuals are situated. It also substantiates the need to understand better how such economic priorities through the category of the good life percolate into the priorities of individuals and socio-culturally accepted ways of doing things.

Not only the sustainable consumption literature, but even research on consumer culture in social psychology has also broadly taken a microsocial perspective, investigating consumer behaviors and choices through the lens of individual social cognitions (e.g., Bagozzi et al., 2002; Kardes et al., 2006; Wänke, 2009). McDonald et al. (2017) show the need to adopt a macrosocial perspective by analyzing the intersection between social psychological concepts of self-identity with neoliberal political economy and consumer culture. By adopting a macrosocial perspective, McDonald et al. (2017) also build on critiques of experimental or mainstream social psychology that argue its individualistic ontology and positivist epistemology constrains its ability to look beyond the individual to understand how societal institutions shape psychological processes and their power relations (Pancer, 1997; Hepburn, 2003; Greenwood, 2004, 2014; Parker, 2007; Fox et al., 2009; Oishi et al., 2009). Along with the need to bridge the gap between agential persuasions and structural factors, what stood out from the above discussion was how political-economic factors play a critical role and demand better conceptual incorporation in the entire dynamic. Mathai et al. (2021) show how a political economy-based production-consumption framework argues for a position at the intersection of individual choice and structural forces to delineate pathways to achieve sustainable consumption.

The literature on sustainable consumption needs to incorporate a border conceptualization of consumers beyond rational economic beings who are expected to respond mechanistically to a greater amount of information or economic incentives and disincentives or even nudges to eventually adopt pro-environmental consumption behaviors (Soron, 2010). The upshot of such a model is that the moral onus of behavioral change squarely rests on individuals conceptualized as consumers. The role the structural factors play in this regard gets categorically ignored. The need is to conceptualize individuals as socio-culturally situated identity project-driven subjects (Bhar, 2019, 2021). Hurth (2010), by accentuating the findings of Giddens (1991) and Stryker and Burke (2000), notes that the self-concept or "identity as a narrative" appears to be a critical conceptual category by which agency and structure can be mediated. In that vein, Soron (2010) notes, "to be successful, efforts to encourage 'sustainable behavior change' must address the legitimate psycho-social anxieties, desires and identity need that, however counterproductively, have been channeled into consumer culture" (p. 179). Therefore, it is to theorize how the act of consumption happens at the complex intersections of political-economic priorities, socio-cultural conventions, and individual aspirations for a better life, which is even more so relevant in the context of the GS. Such a theorization needs to happen in the backdrop that people consume due to varied private motivations and environmental impacts of the consumption-production nexus are always unintended consequences (Akenji, 2013). It implies how critical it is to unearth the deeper motivations and values at the level of individuals that shapes one's consumption patterns (Bhar, 2021). Not only to understand these motivations and values but also to shed light on the process of interaction between structural factors and agential persuasions through which these motivations and values emerge, sustain, and transform in diverse socio-cultural and political-economic settings. Such an understanding would also address the long-standing structure and agency divide in the sustainable consumption literature.

Delineating the scaffolding of a conceptual framework

As already discussed, in the GS context, one more layer of complexity is the fundamental dependency of the neo-liberal economic regimes that drive the developmental trajectory on growthism fuelled by consumerism. In this manner, the globalized

consumer culture shapes the developmental aspirations of these nations. In this context, pathways toward sufficiency, I argue, would fail to offer a higher sense of individual wellbeing as long as the socio-culturally held developmental aspirations to materialistic conveniences shape notions of good life. Undoubtedly, GS needs leap-frogging pathways to realize a higher sense of individual wellbeing within a framework of sufficiency bypassing the post-materialistic routes. Naturally, along with the limitations listed above, I pose that a conceptual framing suited for the GS should shed light on how political-economic priorities percolate into the socio-cultural conventions that shape individual values and consumption choices.

My earlier work has established that the need is now to theorize better the political-discursive process through which these priorities percolate in the socio-cultural and individual realm and eventually give rise to dialogical feedback (Bhar, 2019). Such a conceptual framing should equally pay attention to the role individual values developed at the intersection of the "macro-social" milieu play in shaping consumption decisions and how aspiration and hope for a materialistically better life deeply moderate such a relationship (Bhar, 2019). The dimension of aspiration is particularly pertinent in the GS, where the overwhelming majority still live well below any objectively defined energy and materials required for a decent life. Therefore, better life in such a context means the energy and materialistically dominated standard of life privileged sections both globally as well as in pockets of affluence in the GS enjoy. The fact that the prevalent notion of a better life is materialistically oriented implies that even if, hypothetically, the large impoverished sections of the developing world are provided with an objectively-defendable decent standard of living, it might fail to offer any sense of sustained happiness or wellbeing. In this context, I propose that the notion of good life as a theoretical category can act as a bridge between structural factors and agential persuasions as it can capture what one values in life by encapsulating both the aspirational/symbolic and habitual/practices aspects of consumption patterns (Bhar, 2019, 2021).

The notion of the good life as a conceptual category is not new in the sustainable consumption literature. Scholarly works, theoretically and empirically, attempted to define the notion of the good life within a sustainability framework. The two most prominent approaches to empirically capture the conceptual category of the good life are the needs approach (e.g., Doyal and Gough, 1991; Max-Neef, 1991; Jackson et al., 2004) and the capabilities approach (e.g., Nussbaum, 1992; Robeyns and van der Veen, 2007; Burchardt and Vizard, 2011). The needs approach defines universal needs corresponding to realizing a good life. The capability approach focuses on defining the need-satisfiers that can help achieve those universal needs. Another recent approach developed as an empirical extension of the capability approach is Rao and Baer's (2012) decent living consumption approach. The approach based on Max-Neef's framework attempts to quantify the material basis necessary to realize a decent living consumption standard: a good life permitted under a framework of sufficiency. One overwhelming commonality among these approaches is that all these seem to focus excessively on the "what" aspect of the good life. In other words, different approaches attempt to define the good life, be it at the level of means like need-satisfiers or ends as needs. Unpacking the good life only through a definitional lens will be limited in translating that good life into a real-world scenario. If supposed to happen democratically in a secular context and not expected as a top-down policy imposition, this translation would require a more holistic understanding of the good life both as a process and an outcome. Conceptualizing the dialogical interdependence between the good life as a process and as an outcome is critical to designing pathways that would help us achieve satisfaction or contentment within an ethic of sufficiency. Moreover, the good life as a process needs to pay attention to how the notion of good life is situated within a context shaped by the interplay between individual aspirations and political-economic and socio-cultural factors. The context here determines how the process will ensure the delivery of the outcomes.

At this juncture, the question is: how to conceptualize socio-culturally- and economically- prudent alternative pathways to a sustainable and just world for all that are particularly relevant for the GS and can simultaneously offer individuals a higher sense of wellbeing? Conceptualizing an alternative sense of community becomes crucial, as otherwise sustainable consumption within a framework of sufficiency, especially in the GS, cannot be achieved without bringing fundamental systemic change away from the prevailing neoliberal economic model that thrives on consumerism and orients socio-culturally held definitions of good life toward materialistic need-satisfiers (Kallis et al., 2020). Such communities could help decouple human needs from materialistic need-satisfiers toward a sustainable and just world for all, offering individuals a higher sense of wellbeing. It is not that such attempts toward alternative communities, be they concerted (like Auroville) or rather spontaneous (Hippie culture), are not being made in the past. Several examples of intentional communities or ecovillages worldwide look to find alternative sources of meaning in life beyond pursuing materialistic means (Liftins, 2013; LeVasseur and Warren, 2018; Dias and Loureiro, 2019; Gibbons, 2020). Evidently, the exclusivity that is embedded in such green or alternative ways of life, more often than not, makes such choices as symbols of status and thus attracts those who can afford such (intentionally) expensive tastes (Namakkal, 2021). Two critical questions in this regard that can shape future research trajectories are: does that mean one needs to experience first-hand energy and resource-dependent materialistic living thriving on the individualization project to choose an alternative way of life? In other words, does that mean individuals who are yet leading frugal and thus sustainable standards of life, primarily, due to lack of access and choice, can never consciously choose a more socio-culturally just version of low material-dependent ways of life?

Moreover, research focusing on conceptualizing alternative economic models tends to adopt a macroeconomic perspective and eventually, a top-down approach. However, my research shows how individuals, through their conception of good life, appropriate the larger macroeconomic priorities and in turn, feedback to the same system, giving rise to a self-sustaining process (Bhar, 2019). To elaborate through the example of India–although the creation of the idea of a new middle class in India was a political discursive process instituted post-economic liberalization, the individuals proactively kept appropriating those macroeconomic priorities in their good life definitions and aspiring to lead a life of the West or material opulence (Fernandes, 2000a,b). There are, however,

several examples of alternative value systems that look beyond homogenized definitions of a good life oriented toward individual material possessions and opulence in the GS and elsewhere. A thorough bottom-up understanding of those good life definitions, as attempted by initiatives such as Vikalp Sangam (Kothari, 2020; Das, 2021) and Buen Vivir (Balch, 2013; Acosta and Abarca, 2018), seems critical in delineating socio-cultural and techno-economical pathways for "leapfrogging" for the GS to address the concern of rising inequality without breaching sustainability limits. Both Vikalp Sangam and Buen Vivir are initiatives from the Global South that highlight true wellbeing ("the good life") is only possible as part of a community.

In conclusion, I argue, the need is to develop a bottom-up microeconomic driven understanding of alternative economies that can successfully support alternative attempts to foster good and meaningful lives. It is like constructing alternative economic models that would uphold such alternatives as well as diverse sets of good life definitions. Any alternative economic model to the prevailing neo-liberalism cannot be possible unless the fundamental tendency to push toward individualization based on private material possessions is tackled at its roots. Undoubtedly it is valuable to approach the question of alternative economies by challenging the structural factors like the neo-liberal political economy dependent on and at the same time, driving insatiable consumer demand. However, to reiterate, it is equally important, especially for the GS, to understand how these structural factors percolate into socio-cultural and individual priorities through the changing notions of the good life and eventually act as the fundamental sustaining drivers that keep the prevailing political-economic arrangements running.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Author contributions

The author confirms being the sole contributor of this work and has approved it for publication.

Conflict of interest

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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References

Acosta, A., and Abarca, M. M. (2018). "Buen Vivir: An alternative perspective from the peoples of the global south to the crisis of capitalist modernity," in *The Climate Crisis: South African and Global Democratic Eco-Socialist Alternatives*, ed V. Satgar (Wits University Press), 131–147. doi: 10.18772/22018020541.11

Akenji, L. (2013). Consumer scapegoatism and limits to green consumerism. *J. Clean. Prod.* 63, 13–23. doi: 10.1016/j.jclepro.2013.05.022

Bagozzi, R., Gurhan-Canli, Z., and Priester, J. (2002). *The Social Psychology of Consumer Behaviour*. Philadelphia, PA: Open University Press.

Balch, O. (2013). *Buen Vivir: The Social Philosophy Inspiring Movements in South America*. The Guardian. Available online at: http://www.guardian.co.uk/sustainable-business/blog/buen-vivir-philosophy-south-americaeduardo-gudynas (accessed April 17, 2022).

Bhar, S. (2019). Introducing phenomenological research methodology in sustainable consumption literature: illustrations from India. *Int. J. Qual. Methods*. 18, 1–14. doi: 10.1177/1609406919840559

Bhar, S. (2021). *The Environmental Impacts and Drivers of Consumption in India*. Manipal: Manipal Academy of Higher Education, India.

Bhar, S., Lele, S., and Rao, N. R. (2022). Beyond income: correlates of conspicuous and luxury consumption in India. *Sustainability*. 18, 142–157. doi: 10.1080/15487733.2022.2029041

Booth, D. E. (2020). Postmaterialism's social-class divide: experiences and life satisfaction. *J. Human Values*. 27, 1–20. doi: 10.1177/0971685820946180

Booth, D. E. (2021). Post-materialism as a basis for achieving environmental sustainability. *Popul. Environ.* 5, 97–125. doi: 10.3197/jps.2021.5.2.97

Brand, U., and Markus, W. (2017). "The imperial mode of living," in *Routledge Handbook of Ecological Economics*, Spash, C. L. (ed). (England, UK: Routledge) p. 152–161. doi: 10.4324/9781315679747-19

Burchardt, T., and Vizard, P. (2011). 'Operationalizing' the capability approach as a basis for equality and human rights monitoring in twenty-first-century Britain. *J. Hum. Dev. Capab.* 12, 91–119. doi: 10.1080/19452829.2011.541790

Carrington, M., Neville, B., and Whitwell, G. (2010). Why ethical consumers don't walk their talk: towards a framework for understanding the GAP between the ethical purchase intentions and actual buying behaviour of ethical minded consumer. *J. Busi. Ethics*. 97, 139–158. doi: 10.1007/s10551-010-0501-6

Chancel, L., and Piketty, T. (2019). Indian income inequality, 1922–2014: from British Raj to Billionaire Raj? *Rev. Income Wealth*. 65, S33–S62. doi: 10.1111/roiw.12439

Crabtree, J. (2018). *The Billionaire Raj: A Journey Through India's New Gilded Age*. London: One World Publication.

Das, P. (2021). Rethinking development: Vikalp Sangam and the search for alternatives in India. *Gestión y Ambiente*. 24, 201–223. doi: 10.15446/ga.v24nsupl,1.91896

Dias, M. A., and Loureiro, C. F. B. (2019). A systemic Approach to sustainability-the interconnection of its dimensions in ecovillage practices. *Ambiente Sociedade*. 22. doi: 10.1590/1809-4422asoc0012r1vu19l1ao

Dobers, P., and Strannegard, L. (2005). Design, lifestyles and sustainability: aesthetic consumption in a world of abundance. *Bus. Strategy Environ.* 14, 324–336. doi: 10.1002/bse.495

Doyal, L., and Gough, I. (1991). *A Theory of Human Need*. New York: Palgrave Macmillan. doi: 10.1007/978-1-349-21500-3

Evans, D. M. (2019). What is consumption, where has it been going, and does it still matter? *Sociol. Rev.* 67, 499–517. doi: 10.1177/0038026118764028

Evans, D. M. (2020). After practice? Material semiotic approaches to consumption and economy. *Cult. Sociol.* 14, 340–356. doi: 10.1177/1749975520923521

Fernandes, L. (2000a). Nationalizing the global': media images, cultural politics and the middle class in India. *Media, Culture Society*. 22, 611–628. doi: 10.1177/016344300022005005

Fernandes, L. (2000b). Restructuring the new middle class in liberalizing India. *Comp. Stud. South Asia Afr. Middle East*. 20, 88–104. doi: 10.1215/1089201X-20-1-2-88

Fox, D., Prilleltensky, I., and Austin, S. (2009). "Critical psychology for social justice: Concerns and dilemmas," in *Critical psychology: An introduction (2nd ed.),* Fox, D., Prilleltensky, I., and Austin, S. (eds). (London: Sage) p. 3–19.

Fuchs, D. A. (2007). *Business Power in Global Governance.* Boulder, CO: Lynne Rienner. doi: 10.1515/9781685853716

Garcia, A. C., Ambrose, A., Hawkins, A., and Parkes, S. (2021). High consumption, an unsustainable habit that needs more attention. *Energy Res. Soc. Sci.* 80, 1022–1041. doi: 10.1016/j.erss.2021.102241

Gibbons, L. V. (2020). Regenerative—the new sustainable? *Sustainability.* 12, 5483. doi: 10.3390/su12135483

Giddens, A. (1991). *Modernity and Self-Identity*. Polity: Cambridge.

Gore, T. (2015). *Extreme Carbon Inequality: Why the Paris Climate Deal Must put the Poorest, Lowest Emitting and Most Vulnerable People First.* Oxford: Oxford International.

Gore, T. (2020). *Confronting Carbon Inequality: Putting Climate Justice at the Heart of the COVID-19 Recovery*. Oxford: Oxford International.

Greenindex (2012). *Consumer Choice and the Environment—A Worldwide Tracking Survey.* Available online at: http://images.nationalgeographic.com/wpf/mediacontent/file/GS_NGS_2012GreendexHighlights_10July-cb1341934186.pdf

Greenwood, J. D. (2004). What happened to the 'social' in social psychology? *J. Theory Soc. Behav*. 34, 19–34. doi: 10.1111/j.1468-5914.2004.00232.x

Greenwood, J. D. (2014). The social in social psychology. *Soc. Personal. Psychol. Compass*. 8, 303–313. doi: 10.1111/spc3.12113

Hardoon, D. (2015). *Wealth: Having It All and Wanting More.* Oxfam International.

Hepburn, A. (2003). *An Introduction to Critical Social Psychology.* Thousand Oaks, CA: Sage. doi: 10.4135/9781446218884

Hurst, M., Dittmar, H., Bond, R., and Kasser, T. (2013). The relationship between materialism and post-materialism values and environmental attitudes and behaviors: a meta-analysis. *J. Environ. Psychol*. 36, 257–269. doi: 10.1016/j.jenvp.2013.09.003

Hurth, V. (2010). Creating sustainable identities: the significance of the financially affluent self. *Sust. Deve*. 18, 123–134. doi: 10.1002/sd.453

Inglehart, R. F. (2008). Changing values among Western publics from 1970 to 2006. *West Eur. Polit*. 31, 130–146. doi: 10.1080/01402380701834747

Jackson, T. (2005). Live better by consuming less? Is there a 'double dividend' in sustainable consumption? *J. Industrial Ecol*. 9, 19–36. doi: 10.1162/1088198054084734

Jackson, T. (2006). "Challenges for sustainable consumption policy," in *The Earthscan Reader in Sustainable Consumption,* Jackson T. (ed). (Earthscan: Sterling, VA) p. 109–126.

Jackson, T., Jager, W., and Stagl, S. (2004). "Beyond insatiability—needs theory, consumption and sustainability," in *The Ecological Economics of Consumption*, Reisch L., and Røpke I. (eds). (Cheltenham, Northampton: Edward Elgar) p. 79–110.

Kallis, G., Paulson, S., D'Alisa, G., and Demaria, F. (2020). *The Case for Degrowth*. Hoboken, New Jersey: John Wiley & Sons.

Kardes, F. R., Herr, P. M., and Nantel, J. (2006). *Applying Social Cognition to Consumer-Focused Strategy*. Hove, UK: Psychology Press. doi: 10.4324/9781410613271

Kastner, I., and Matthies, E. (2014). Motivation and impact. Implications of a twofold perspective on sustainable consumption for intervention programs and evaluation designs. *GAIA*. 23, 175–185. doi: 10.14512/gaia.23.S1.5

Kothari, A. (2020). Earth Vikalp Sangam: proposal for a global tapestry of alternatives. *Globalizations.* 17, 245–249. doi: 10.1080/14747731.2019.1670955

LeVasseur, T., and Warren, L. (2018). "Redesigning community as an ecovillage: Lessons from Earthaven," in *Strongly Sustainable Societies*. England, https://www.google.com/search?client=firefox-b-d&q=UK&stick=H4sIAAAAAAAAAONgVuLQz9U3MC8uTl7EyhTqDQBuxFlpEQAAAA&sa=X&ved=2ahUKEwi4jaDOjsf9AhXfF1kFHWdKBdQQmxMoBHoECGcQBg UK: Routledge. p. 268–285. doi: 10.4324/9781351173643-1

Liftins, K. T. (2013). *Ecovillages: Lessons for Sustainable* Community. USA: Polity Press.

Mathai, M. V., Isenhour, C., Stevis, D., Vergragt, P., Bengtsson, M., Lorek, S., et al. (2021). The political economy of (un)sustainable production and consumption: a multidisciplinary synthesis for research and action. *Resour Conserv Recycl*. 167, 105265. doi: 10.1016/j.resconrec.2020.105265

Matthew, N.V. (2021). "Sustainable Consumption: A view from the Global South," in *Social and Political Research Foundation*. Available online at: https://sprf.in/sustainable-consumption-a-view-from-the-global-south/ (accessed 22 November, 2022).

Max-Neef, M. (1991). *Human Scale Development: Conception, Application and Further Reflections*. New York, NY: The Apex Press.

McDonald, M., Gough, B., Wearing, S., and Deville, A. (2017). Social psychology, consumer culture and neoliberal political economy. *J. Theory Soc. Behav*. 47, 363–379. doi: 10.1111/jtsb.12135

Middlemiss, L. (2018). *Sustainable Consumption: Key Issues in Environment and Sustainability*. England, UK: Routledge. doi: 10.4324/9781315628035

Moser, S., and Kleinhückelkotten, S. (2018). Good Intents, but Low Impacts. Diverging importance of motivational and socioeconomic determinants explaining pro-environmental behaviours, energy use, and carbon footprint. *Environ. Behav.* 50, 626–656. doi: 10.1177/0013916517710685

Namakkal, J. (2021). Unsettling Utopia: The making and unmaking of French India. USA: Columbia University Press. doi: 10.7312/nama19768

Newell, P., Michelle, T., and Freddie, D. (2021). Scaling behaviour change for a 1.5-degree world: challenges and opportunities. *Global Sustainab.* 4, E22. doi: 10.1017/sus.2021.23

Nussbaum, M. (1992). Human functioning and social justice. *Public Theory*. 2, 202–246. doi: 10.1177/0090591792020002002

Oishi, S., Kesebir, S., and Snyder, B. H. (2009). Sociology: a lost connection in social psychology. *Pers. Soc. Psychol. Rev.* 13, 334–353. doi: 10.1177/1088868309347835

Pancer, S. M. (1997). "Social psychology: the crisis continues," in *Critical psychology: An introduction,* Fox, D., and Prilleltensky, I. (eds). (Thousand Oaks CA: Sage Publications) p. 150–165.

Parker, I. (2007). *Revolution in Psychology: Alienation to Emancipation*. Ann Arbor, MI: Pluto Press.

Rao, N., and Baer, P. (2012). Decent living emissions: a conceptual framework. *Sustainability*. 4, 656–681. doi: 10.3390/su4040656

Robeyns, I., and van der Veen, R. J. (2007). *Sustainable Quality of Life: Conceptual Analysis for a Policy-Relevant Empirical Specification*. Bilthoven, Amsterdam: Netherlands Environmental Assessment Agency and University of Amsterdam.

Sahakian, M., Fuchs, D., Lorek, S., and Antonietta, D. G. (2021). Advancing the concept of consumption corridors and exploring its implications. *Sustainability*. 17, 305–315. doi: 10.1080/15487733.2021.1919437

Shove, E., Pantzar, M., and Watson, M. (2012). *The Dynamics of Social Practice: Everyday Life and How it Changes*. London: Sage. doi: 10.4135/9781446250655

Siddiqui, K. (2012). Developing countries' experience with neoliberalism and globalisation. *Res. Appl. Econ*. 4, 12–37. doi: 10.5296/rae.v4i4.2878

Soron, D. (2010). Sustainability, self-identity and the sociology of consumption. *Susta. Dev*. 18, 172–181. doi: 10.1002/sd.457

Spengler, L. (2016). Two types of 'enough': sufficiency as minimum and maximum. *Env. Polit.* 25, 921–940. doi: 10.1080/09644016.2016.1164355

Stryker, S., and Burke, P. J. (2000). The past, present and future of an identity theory. *Soc. Psychol. Q.* 63, 284–297. doi: 10.2307/2695840

Terlau, W., and Hirsch, D. (2015). Sustainable consumption and the attitude behavior gap phenomenon–causes and measurements towards a sustainable development. *Int. J. Food Syst. Dynam*. 6, 159–174. doi: 10.18461/1869-6945-14

Wänke, M. (2009). *Social Psychology of Consumer Behavior*. Hove, UK: Psychology Press.

Warde, A. (2010). *Consumption*. London: Sage.

Warde, A. (2014). After taste: culture, consumption and theories of practice. *J. Cons. Culture.* 14, 279–303. doi: 10.1177/1469540514547828

Wilk, R. (2002). Consumption, human needs, and global environmental change. *Global Environ. Change*.12, 5–13. doi: 10.1016/S0959-3780(01)00028-0

Young, W., Hwang, K., McDonald, S., and Oates, C. (2010). Sustainable consumption: green consumer behaviour when Purch products. *Susta. Dev*. 18, 20–31. doi: 10.1002/sd.394

Zhou, J. (2010). Participation in the environmental movement: Resource mobilization theory vs. post- materialism values: the example of Xiamen PX. *Chinese J. Popul. Resour. Environ.* 20, 41–47.

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